Allen-Bradley

PowerFlex® Communications

Profibus Adapter

22-COMM-P
FRN 2.xxx

User Manual

Rockwell Automation

Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. "*Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls*" (Publication SGI-1.1 available from your local Rockwell Automation Sales Office or online at **http://www.ab.com/manuals/gi**) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

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The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual we use notes to make you aware of safety considerations.

ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.

Attentions help you:

- identify a hazard
- avoid the hazard
- recognize the consequences

Important: Identifies information that is especially important for successful application and understanding of the product.

Shock Hazard labels may be located on or inside the drive to alert people that dangerous voltage may be present.

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Profibus is a trademark of the Profibus Vendor Association.

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Related Documentation

For:	Refer to:	Publication
DriveExplorer™	*DriveExplorer Getting Results Manual* Online help (installed with the software)	9306-5.2
DriveTools™ SP	*www.ab.com/drives/drivetools/Index*	–
HIM	*PowerFlex 4-Class HIM Quick Reference*	22HIM-QR001…
PowerFlex 40 Drive	*PowerFlex 40 User Manual* *PowerFlex 40 Quick Start*	22B-UM001… 22B-QS001…
RSLinx™	*Getting Results with RSLinx* Online help (installed with the software)	9399-WAB32GR
RSLogix™ 5	*RSLogix 5 Getting Results Guide* Online help (installed with the software)	9399-RL53GR
RSLogix 500	*RSLogix 500 Getting Results Guide* Online help (installed with the software)	9399-RL50GR
Scanner	*SST-PFB-SLC User's Guide*	Version 2.03
SLC	*SLC 500 Modular Hardware Style Installation and Operation Manual*	1747-6.2
SLC	*SLC 500 and MicroLogix 1000 Instruction Set*	1747-6.15

Documentation for the above and this manual can be obtained online at http://www.ab.com/manuals.

Documentation from SST / Woodhead can be obtained online at http://www.mysst.com/download.

Conventions Used in this Manual

The following conventions are used throughout this manual:

- Parameter names are shown in the following format **Parameter xx - [*]**. The xx represents the parameter number. The * represents the parameter name. For example **Param. 04 - [P-DP Addr Actual]**.
- Menu commands are shown in bold type face and follow the format **Menu > Command**. For example, if you read "Select **File > Open**," you should click the **File** menu and then click the **Open** command.
- The firmware release is displayed as FRN X.xxx. The "FRN" signifies Firmware Release Number. The "X" is the major release number. The "xxx" is the minor update number. This manual is for Firmware release 2.xxx.
- This manual provides information about the Profibus adapter and using it with PowerFlex 40 drives. The adapter can be used with other products that support an internal DSI adapter. Refer to the documentation for your product for specific information about how it works with the adapter.

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Local Product Support

Contact your local Rockwell Automation representative for sales and order support, product technical training, warranty support, and support service agreements.

Technical Product Assistance

If you need to contact Rockwell Automation for technical assistance, please review the information in Chapter 8, Troubleshooting first. If you still have problems, then call your local Rockwell Automation representative.

U.S. Allen-Bradley Drives Technical Support:
E-mail: support@drives.ra.rockwell.com
Tel: (1) 262.512.8176
Fax: (1) 262.512.2222
Online: **www**.ab.com/support/abdrives

UK Customer Support Center:
E-mail: esupport2@ra.rockwell.com
Tel: +44 (0) 870 2411802
Fax: +44 (0) 1908 838804

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Fax: +49 (0) 2104 960-501

Summary of Changes

The information below summarizes the changes to this manual since its first release (February 2004) of the Profibus adapter FRN 2.xxx:

Description of New or Updated Information	See Page(s)
Use of ferrites clarified. - Note: 3) canceled - Point 6. added: - New text and Ferrite Selection Table added - Two Notes (1) and (2) for CE compliance added	2-6
IMPORTANT Note modified	7-6
New Event, Code 19 Not COMM Flt added	8-6
Note (1) added for Logic bits 14 and 15	C-2

Getting Started

The 22-COMM-P Profibus adapter is a communication option intended for installation into a PowerFlex 40 drive. It can also be used with other Allen-Bradley products that support an internal DSI adapter.
The Multi-Drive feature (Chapter 7) also provides a means for PowerFlex 4 drives and other DSI Hosts to connect to Profibus.

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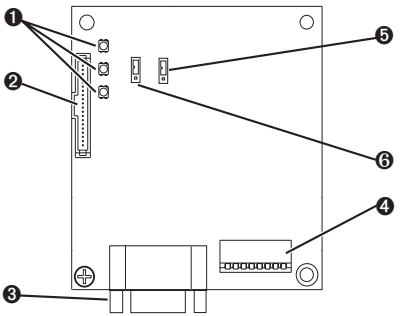
Components

Figure 1.1 Components of the Adapter



Item	Part	Description	Refer to
❶	Status Indicators	Three LEDs that indicate the status of the connected drive, adapter, and network.	Chapter 8, Troubleshooting
❷	DSI Connector	A 20-pin, single-row shrouded male header. An Internal Interface cable is connected to this connector and a connector on the drive.	
❸	Profibus Connector	A 9-pin, female D-Sub connector.	
❹	Node Address/ Firmware Update Switches	Switches (SW1-7) for setting the node address and SW8 for Firmware flash updating.	Chapter 2, Installing the Adapter
❺	Mode Jumper (J2)	Selects Single or Multi-Drive mode of operation.	
❻	SWAP Jumper (J3)	Determines the Intel or Motorola (SWAP) data format for the corresponding PLC.	

Features

The Profibus adapter features the following:

- The adapter is mounted in the PowerFlex 40 drive. It receives the required power from the drive (DSI Host).
- The low seven bits of 8-bit DIP switch let you set a node address, and the MSB bit provides write access for the Flash update of module firmware.
- Depending on the jumper position "1X" or “5X”, the two operation modes “Single” and “Multiple” are supported:

  - In Single Drive Mode (default mode), the adapter represents a single drive on one node and can support one additional external peripheral (HIM or 22-SCM-232) over DSI.

  - In Multi-Drive Mode, the adapter represents up to 5 drives on one node daisy-chained over the RS-485 interface. In this case, the unit will not operate with DSI peripheral devices such as the HIM or the 22-SCM-232.
- Status indicators report the status of the drive communications, adapter, and network.

  - Following the conventions established for core network DSI adapters, three LEDs report the different status: the top most LED represents the status of the interface (Port) to the drive Host, the second LED reports the status of the Comm card (MOD) itself, and the third LED is for the status of the Profibus network (NET).
- User-defined fault actions determine how the adapter and PowerFlex drive respond to communication disruptions (faults) on the network and controllers in idle mode.
- The I/O messages (i.e. Control/Status, Reference/Feedback) will be exchanged with Profibus master in every bus cycle. The Synch & Freeze modes are supported. I/O configuration is fixed and no Datalinks is supported.
- The slave device's parameters on the Profibus network can be configured and monitored using Parameter Messaging.
- Also, for the Single Drive mode, the slave device's parameters on the Profibus network can be configured and monitored by the software tools Drive Explorer or DriveTools SP via DSI.

Compatible Products

The Profibus adapter is compatible with Allen-Bradley PowerFlex 40 drives and other products that support an internal DSI adapter. At the time of publication, compatible products include:

- PowerFlex 40 drives

The Multi-Drive feature (Chapter 7) also provides a means for PowerFlex 4 drives and other DSI Hosts to connect to Profibus.

Required Equipment

Equipment Shipped with the Adapter

When you unpack the adapter, verify that the package includes:

- ❑ One Profibus adapter
- ❑ A 2.54 cm (1 in.) and a 12.7 cm (5 in.) Internal Interface cable (only one cable is needed to connect the adapter to the drive)
- ❑ One grounding wrist strap
- ❑ One floppy disc with GSD file
- ❑ This manual

User-Supplied Equipment

To install and configure the Profibus adapter, you must supply:

- ❑ A small flathead screwdriver
- ❑ Profibus cable
  - – One 9-pin, male D-Sub Profibus connector.
    [**Note**: Profibus connectors are available from a variety of sources and in various sizes. As such, there may be mechanical limitations that prohibit the use of some connectors.]
- ❑ Configuration tool, such as:
  - – PowerFlex 4-Class HIM (22-HIM-*)
  - – DriveExplorer (version 3.01 or higher)
    - uses 22-SCM-232 DSI serial converter (version 2.001 or higher)
  - – DriveTools SP version 2.02 or higher
- ❑ Profibus configuration software
- ❑ Controller configuration software

Safety Precautions

Please read the following safety precautions carefully:

ATTENTION: Risk of injury or death exists. The PowerFlex drive may contain high voltages that can cause injury or death. Remove all power from the PowerFlex drive, and then verify power has been removed before installing or removing an adapter.

ATTENTION: Risk of injury or equipment damage exists. Only personnel familiar with drive and power products and the associated machinery should plan or implement the installation, start-up, configuration, and subsequent maintenance of the product using a Profibus adapter. Failure to comply may result in injury and/or equipment damage.

ATTENTION: Risk of injury or equipment damage exists. If the Profibus adapter is transmitting control I/O to the drive, the drive may fault when you reset the adapter. Determine how your drive will respond before resetting an adapter.

ATTENTION: Risk of injury or equipment damage exists. **Parameters 09 - [Comm Flt Action]** and **10 - [Idle Flt Action]** let you determine the action of the adapter and connected PowerFlex drive if communications are disrupted. By default, these parameters fault the PowerFlex drive. You can set these parameters so that the PowerFlex drive continues to run. Precautions should be taken to ensure that the settings of these parameters do not create a hazard of injury or equipment damage.

ATTENTION: Hazard of injury or equipment damage exists. When a system is configured for the first time, there may be unintended or incorrect machine motion. Disconnect the motor from the machine or process during initial system testing.

ATTENTION: Hazard of injury or equipment damage exists. The examples in this publication are intended solely for purposes of example. There are many variables and requirements with any application. Rockwell Automation does not assume responsibility or liability (to include intellectual property liability) for actual use of the examples shown in this publication.

Quick Start

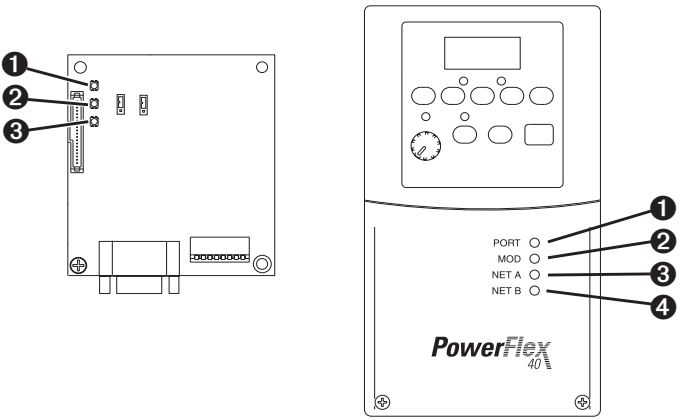
This section is designed to help experienced users start using the Profibus adapter. If you are unsure how to complete a step, refer to the referenced chapter.

Step		Refer to
1	**Review the safety precautions for the adapter.**	Throughout This Manual
2	**Verify that the PowerFlex drive is properly installed.**	Drive User Manual
3	**Commission the adapter.** Set a unique node address using the DIP-switch for Bit 1 to 7 on the adapter.	Chapter 2, Installing the Adapter
4	**Install the adapter.** Verify that the PowerFlex drive and Profibus network are not powered. Then, connect the adapter to the network using a Profibus cable and to the drive using the internal Interface cable. Use the captive screws to secure and ground the adapter to the drive.	
5	**Apply power to the adapter.** The adapter receives power from the drive. Apply power to the drive. The status indicators should be green. If they flash red, there is a problem.	
6	**Set up the drive parameters** Before starting, configuring and working with the Profibus adapter, the following drive parameters must be set: **P036 [Start Source]** to 5 "RS485(DSI) port" if Start is controlled from the network. **P038 [Speed Reference]** to 5 "RS485(DSI) port" if the Speed Reference is controlled from the network.	Page 3-4
	For **Multi Drive Mode** the following additional drive parameters must be set: A103, A104, A107.	Page 7-6
7	**Configure the adapter for your application.** Set the following parameters for the adapter as required by your application: • Node address • I/O configuration • Fault actions	Chapter 3, Configuring the Adapter
8	**Apply power to the Profibus master and other devices on the network.** Verify that the master and network are installed and functioning in accordance with Profibus standards, and then apply power to them.	
9	**Configure the scanner to communicate with the adapter.** Use a network tool for Profibus to configure the master on the network.	Chapter 4, Configuring the Profibus Scanner
10	**Create a ladder logic program.** Use a programming tool such as RSLogix to create a ladder logic program that enables you to do the following: • Control the adapter and connected drive. • Monitor or configure the drive using Parameter Messaging.	Appendix D, SLC Ladder Logic Examples

Status of Operation

The adapter uses three status indicators to report its operating status. They can be viewed through the drive cover. See Figure 1.2.

Figure 1.2 Status Indicators *(location on drive may vary)*



Item	Status Indicator	Status(1)	Description
❶	PORT	Green	Normal Operation. The adapter is properly connected and is communicating with the drive.
		Flashing Green	Not used
❷	MOD	Green	Normal Operation. The adapter is operational and is transferring I/O data.
		Flashing Green	Normal Operation. The adapter is operational but is not transferring I/O data.
❸	NET A	Green	Normal Operation. The adapter is properly connected and communicating on the network.
		Flashing Green	Not used
❹	NET B	Off	Not used for Profibus adapter.

(1) If all status indicators are off, the adapter is not receiving power.
Refer to Chapter 2, Installing the Adapter, for instructions on installing the adapter.
If any other conditions occur, refer to Chapter 8, Troubleshooting.

Installing the Adapter

Chapter 2 provides instructions for installing the adapter in a PowerFlex 40 drive.

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Preparing for an Installation

Before installing the Profibus adapter:

- Verify that you have all required equipment. Refer to Chapter 1, Required Equipment.

Commissioning the Adapter

To commission the adapter, you must set a unique node address and check the data rate that is used by the network. (Refer to the Glossary for details about node addresses.)

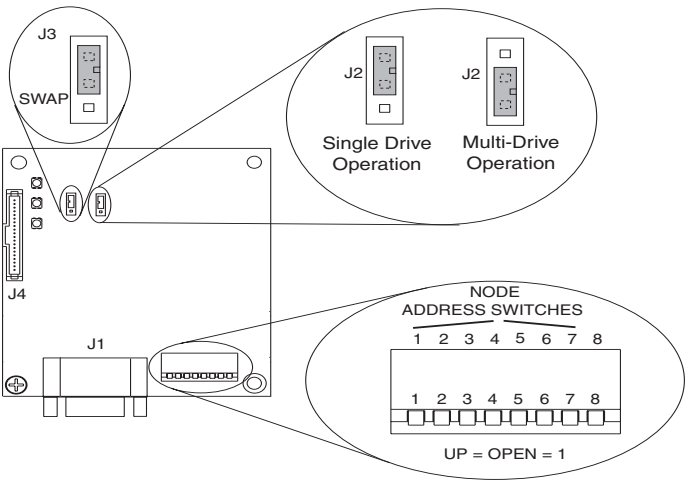
Important: New settings are recognized only when power is applied to the adapter. If you change a setting, cycle power.

ATTENTION: Risk of equipment damage exists. The Profibus adapter contains ESD (Electrostatic Discharge) sensitive parts that can be damaged if you do not follow ESD control procedures. Static control precautions are required when handling the adapter. If you are unfamiliar with static control procedures, refer to *Guarding Against Electrostatic Damage*, Publication 8000-4.5.2.

1. Set the adapter Node Address / Firmware Update switches (see Figure 2.1).

The Profibus Node Address/Firmware Update State is settable through the use of an 8-bit DIP switch. The low seven bits let you set a node address and the valid address allows binary coding of 1 through 125. New settings of node address are recognized only when power is applied to the adapter, cycle power or after a Reset Module command. The MSB bit provides write access for the module flash firmware update.
In normal operating state, SW8 should be set to 1.

Figure 2.1 Setting the Node Address/Firmware Update Switches, Byte Swap Jumper and Single/Multi-Drive Operation Jumper



Switches	Description	Default
SW 1	Least Significant Bit (LSB) of Node Address	1
SW 2	Bit 1 of Node Address	1
SW 3	Bit 2 of Node Address	1
SW 4	Bit 3 of Node Address	1
SW 5	Bit 4 of Node Address	1
SW 6	Bit 5 of Node Address	1
SW 7	Most Significant Bit (MSB) of Node Address	1
SW 8	SW8 Firmware Update	1

SW 8 Setting	Description
0	Write Access Firmware Update
1	Normal Operating State

Important: In normal operating state, SW8 should be set to 1.

Figure 2.2 Node Address Switch Settings (UP = OPEN = 1)

Switch Setting							Node
SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	Addr.
0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	1
0	1	0	0	0	0	0	2
1	1	0	0	0	0	0	3
0	0	1	0	0	0	0	4
1	0	1	0	0	0	0	5
0	1	1	0	0	0	0	6
1	1	1	0	0	0	0	7
0	0	0	1	0	0	0	8
1	0	0	1	0	0	0	9
0	1	0	1	0	0	0	10
1	1	0	1	0	0	0	11
0	0	1	1	0	0	0	12
1	0	1	1	0	0	0	13
0	1	1	1	0	0	0	14
1	1	1	1	0	0	0	15
0	0	0	0	1	0	0	16
1	0	0	0	1	0	0	17
0	1	0	0	1	0	0	18
1	1	0	0	1	0	0	19
0	0	1	0	1	0	0	20
1	0	1	0	1	0	0	21
0	1	1	0	1	0	0	22
1	1	1	0	1	0	0	23
0	0	0	1	1	0	0	24
1	0	0	1	1	0	0	25
.							.
.							.
.							.
0	0	0	0	1	1	1	112
1	0	0	0	1	1	1	113
0	1	0	0	1	1	1	114
1	1	0	0	1	1	1	115
0	0	1	0	1	1	1	116
1	0	1	0	1	1	1	117
0	1	1	0	1	1	1	118
1	1	1	0	1	1	1	119
0	0	0	1	1	1	1	120
1	0	0	1	1	1	1	121
0	1	0	1	1	1	1	122
1	1	0	1	1	1	1	123
0	0	1	1	1	1	1	124
1	0	1	1	1	1	1	125

2. Verify the Network Baud rate, which is set by the network master and depends on cable length (see Glossary).

   The 22-COMM-P module uses the Auto-Baud function, which allows the module to recognize the current baud rate and sets itself to the transmission rate by the master automatically.

   The 22-COMM-P module supports the following different data rates: 9.6kbps, 19.2kbps, 45.45kbps, 93.75kbps, 187.5kbps, 500kbps, 1.5Mbps, 3Mbps, 6Mbps, and 12Mbps. After detecting the correct baud rate, the baud rate that was found is monitored continuously.

3. Set the Byte Swap jumper J3, which determines the Intel or Motorola (position SWAP) data format, depending on the corresponding PLC. (see Figure 2.1)

4. Verify the Adapter Mode jumper J2 in "1X" for Single Drive operation, or set J2 in "5X" for Multi Drive operation -(see Figure 2.1 and these setting descriptions below).
   For complete details on Multi-Drive mode operation, see Chapter 7, Using Multi-Drive Mode.

Jumper Setting	Description
Right position or jumper missing	Sets the adapter for Single drive mode (default setting) using a single drive connection. **Important:** In this mode, connections to multiple drives must be removed since all powered and connected hosts will respond to any message sent by the adapter.
Left position	Sets the adapter for Multi-Drive operation mode using up to 5 different drives. DSI peripherals do not operate with the adapter in this mode.

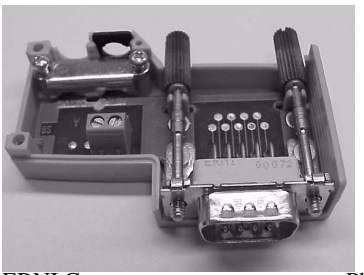
Connecting the Adapter to the Network

ATTENTION: Risk of injury or death exists. The PowerFlex drive may contain high voltages that can cause injury or death. Remove all power from the PowerFlex drive, and then verify power has been removed before installing or removing an adapter.

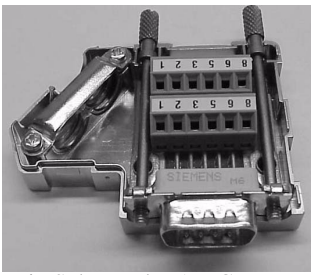
1. Remove power from the drive.
2. Use static control precautions.
3. Remove the drive cover

4. Connect a Profibus connector to the cable. (See Figure 2.3 and Figure 2.4). Only use cable that conforms to Profibus cable standards. Belden #3079A Profibus cable or equivalent is recommended.
   [**Note**: Profibus connectors are available from a variety of sources and in various sizes. As such, there may be mechanical limitations that prohibit the use of some connectors. ERNI Profibus vertical (Node Part # 103658 and Termination Part # 103659), or Phoenix Subcon Plus M1 (Part # 2761826) are recommended for use with PowerFlex 40 drives.]

Figure 2.3 Connecting to the Cable



ERNI Connector



Phoenix Subcon Plus 1M Connector

Figure 2.4 Network Wiring Diagram

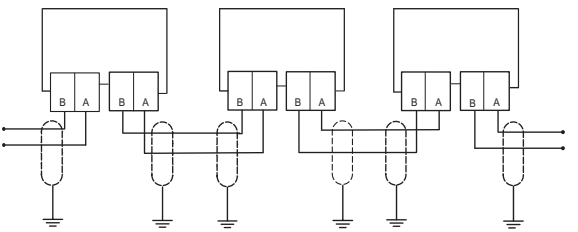


Figure 2.5 22-COMM-P DB-9 pin layout

Terminal	Signal	Function
Housing	Shield	
1 and 2	Not connected	
3	B-LINE	Positive RxD/TxD, according to RS485 specification
4	RTS	
5	GND BUS	Isolated GND from bus
6	+5V BUS	Isolated +5V from bus
7 and 9	Not connected	
8	A-LINE	Negative RxD/TxD according to RS485 specification

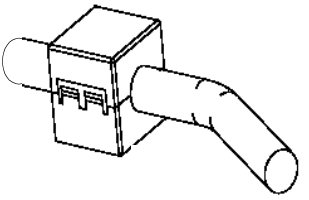
5. Connect the Profibus cable to the network, secure it with the two retaining screws on the connector, and route it through the bottom of the PowerFlex drive (See Figure 2.4.)

Note: 1) The screws on some connectors tie the Profibus cable ground/ shield to the metal of the socket. In some cases, Profibus will not operate correctly without this connector.

2) Keep wiring away from high noise sources such as motor cables.

6. Depending on the switching frequency of PF40, it is optional to use the ferrite cable clamp around the communication cables next to the D-Sub connector, to reduce high frequency emission. See Figure 2.6.

Figure 2.6 Optional Clamp-On Ferrite Cable Clamp



To meet the requirements of EN55011 Class A or B, the conditions listed below must be satisfied. ,

Switching Frequency of PF40	EN55011 Class A	EN55011 Class B
4 kHz	No ferrite required	Use one ferrite Ferrishield (part No. HI28B2039) or Fair-Rite (part No. 0443164151)
6 kHz		
8 kHz		
16 kHz		Use three clip ferrites TDK, type ZCAT 3035-1330

Note: 1) For the conditions to satisfy the essential requirements for CE compliance on PowerFlex drives, please refer to the PowerFlex manual.

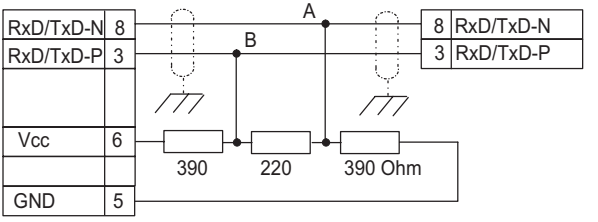
2) In applications where first environment, unrestricted distribution is requested (EN55011 group 1, class B), the installation requires a shielded enclosure. See PowerFlex manual.

Termination

The first and last node on the Profibus network needs to be terminated by using a Profibus connector with terminating resistors (See Figure 2.7.)

Some connector manufacturers offer standard terminating connectors, such as the yellow ERNI Profibus termination vertical connector (Part # 103659). Standard Profibus node connectors, such as the Phoenix Subcon Plus M1 (Part #2761826), can be configured as a terminating connector by adding resistors

Figure 2.7 Connection for terminating resistors



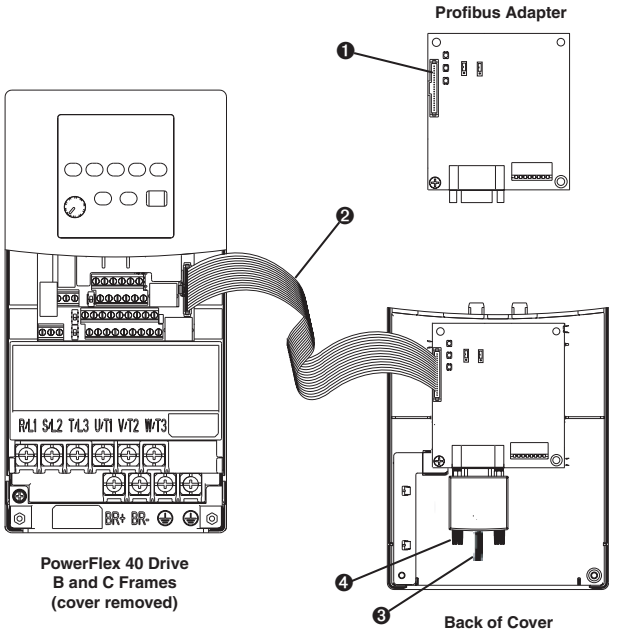
Connecting the Adapter to the Drive

1. Remove power from the drive.
2. Use static control precautions.
3. Mount the adapter on the required special drive cover (**ordered separately** — see Figure 2.8 for part numbers).
   - C Frame: Use the adapter screw to secure the adapter to the cover.
   - B Frame: Disregard the screw and snap the adapter in place.

Important: For C Frame drives, tighten the adapter's lower left screw to ground the adapter (Figure 2.9). For B Frame drives, install the special drive cover onto the drive using both cover fasteners to ground the adapter.

4. Connect the Internal Interface cable to the DSI port on the drive and then to the mating DSI connector on the adapter.

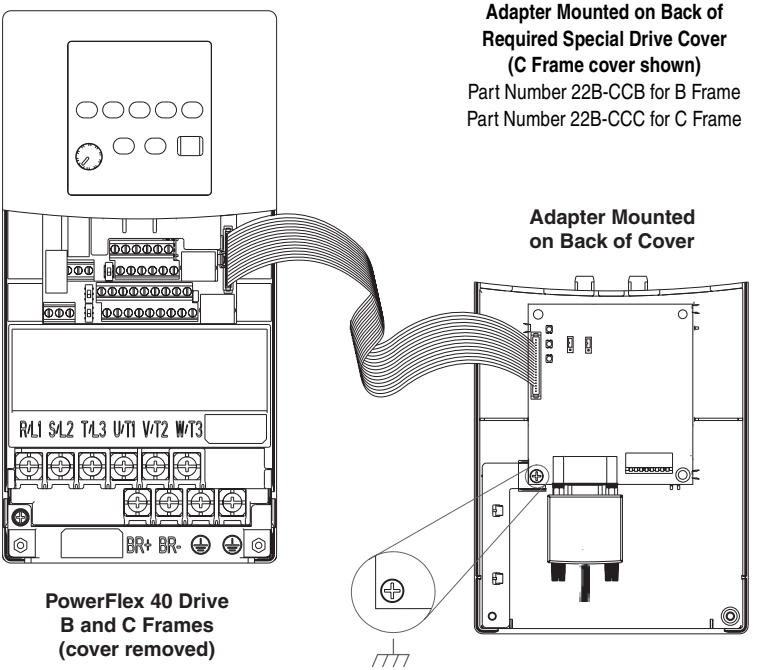
Figure 2.8 DSI Ports and Internal Interface Cables



Back of Required Special Drive Cover (ordered separately):
Part Number 22B-CCB for B Frame
Part Number 22B-CCC for C Frame

#	Description	#	Description
❶	DSI Connector	❸	Profibus cable
❷	15.24 cm (6 in.) Internal Interface cable	❹	Retaining screws

Figure 2.9 Mounting the Adapter



Adapter Mounted on Back of Required Special Drive Cover (C Frame cover shown)
Part Number 22B-CCB for B Frame
Part Number 22B-CCC for C Frame

Adapter Mounted on Back of Cover

PowerFlex 40 Drive B and C Frames (cover removed)

Ground for C Frame drives

NOTE: For B Frame drives, the lower left adapter screw does not ground the adapter. To ground the adapter, install the special drive cover onto the drive using both cover fasteners.

Applying Power

ATTENTION: Risk of equipment damage, injury, or death exists. Unpredictable operation may occur if you fail to verify that parameter settings and switch settings are compatible with your application. Verify that settings are compatible with your application before applying power to the drive.

1. Install the required special cover on the drive. The status indicators can be viewed on the front of the drive after power has been applied.
2. Ensure that the adapter will have a unique address on the network. If a new address is needed, reset its switches (refer to Commissioning the Adapter in this chapter).
3. Apply power to the PowerFlex drive. The adapter receives its power from the connected drive and network. When you apply power to the product and network for the first time, the status indicators should be green after an initialization. If the status indicators go red, there is a problem. Refer to Chapter 8, Troubleshooting.
4. Apply power to the master device and other devices on the network.

Configuring the Adapter

Chapter 3 provides instructions and information for setting the Profibus parameters in the adapter.

Topic	Page
Configuration Tools	3-1
Using the PowerFlex 4-Class HIM	3-2
Using the DriveExplorer via 22-SCM-232	3-3
Setting the I/O Configuration	3-4

Topic	Page
Setting a Fault Action	3-5
Resetting the Adapter	3-6
Viewing the Adapter Configuration	3-7

For a complete list of parameters, refer to Appendix B, Adapter Parameters . For definitions of terms in this chapter, refer to the Glossary.

Configuration Tools

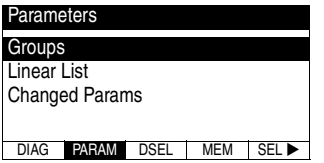
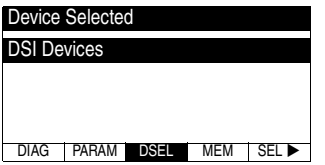
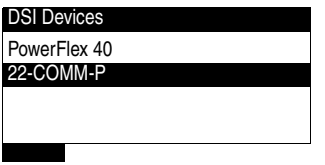
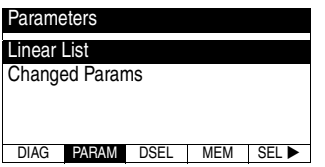
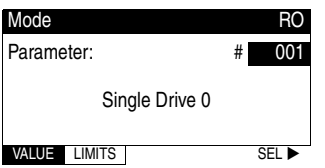
The Profibus adapter stores parameters and other information in its own non-volatile memory. You must, therefore, access the adapter to view and edit its parameters. A number of configuration tools can be used to configure the adapter and connected drive for the Single Drive mode. The tools include:

Tool	Refer To:
DriveExplorer (version 3.01 or higher)	*DriveExplorer Getting Results Manual*, Publication 9306-5.3, or the online help
DriveTools SP (version 2.02 or higher)	*DriveTools SP Online Help*
PowerFlex 4-Class HIM (22-HIM-*)	PowerFlex 4-Class HIM (22-HIM-*) page 3-2

Using the PowerFlex 4-Class HIM

The PowerFlex 4-Class HIM (Human Interface Module) can be used to access parameters in the adapter (see basic steps shown below). It is recommended that you read through the steps for your HIM before performing the sequence. For additional HIM information, refer to your HIM Quick Reference card.

Using the HIM

Step	Key(s)	Example Screens
1. Power up the drive. Then plug the HIM into the drive. The **Parameters** menu for the drive will be displayed.		
2. Press Sel key once to display the **Device Select** menu.	Sel	
3. Press Enter to display the **DSI Devices** menu. Press Down Arrow to scroll to 22-COMM-P.	Enter and ▼	
4. Press Enter to select the Profibus adapter. The **Parameters** menu for the adapter will be displayed.	Enter	
5. Press Enter to access the parameters. Edit the adapter parameters using the same techniques that you use to edit drive parameters.	Enter	

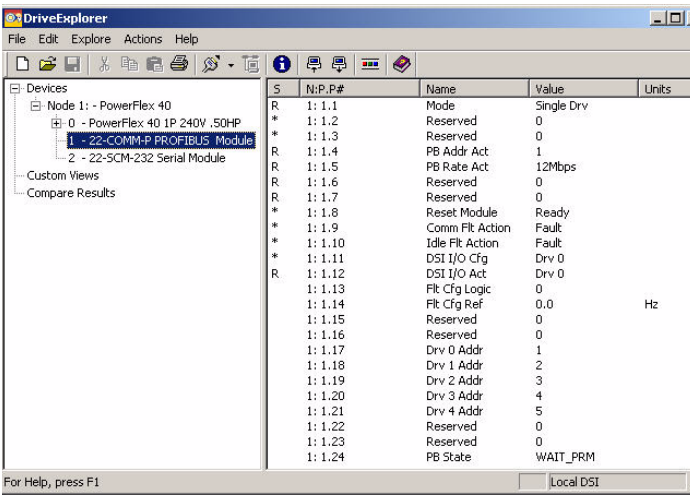
Using the DriveExplorer via 22-SCM-232

The DriveExplorer can be used to access parameters in the adapter. Use the DriveExplorer (version 3.01 or higher) and the 22-SCM-232 (version 2.001 or higher).

1. Connect the 22-SCM-232 to the PowerFlex 40 and to a PC serial COM port, the apply power to the PowerFlex 40 drive.

2. Open the DriveExplorer and press the "Connect Serial"-button in the toolbar. In the left window under "Devices", "Node 1: PowerFlex 40" appears. There are 3 configurable devices: the PowerFlex 40, the Profibus adapter and the serial module 22-SCM-232.

Using the DriveExplorer


DriveExplorer
File Edit Explore Actions Help
Devices
Node 1: - PowerFlex 40
0 - PowerFlex 40 1P 240V .50HP
1 - 22-COMM-P PROFIBUS Module
2 - 22-SCM-232 Serial Module
Custom Views
Compare Results
S N:P.P# Name Value Units
R 1: 1.1 Mode Single Drv
* 1: 1.2 Reserved 0
* 1: 1.3 Reserved 0
R 1: 1.4 PB Addr Act 1
R 1: 1.5 PB Rate Act 12Mbps
R 1: 1.6 Reserved 0
R 1: 1.7 Reserved 0
* 1: 1.8 Reset Module Ready
* 1: 1.9 Comm Flt Action Fault
* 1: 1.10 Idle Flt Action Fault
* 1: 1.11 DSI I/O Cfg Drv 0
R 1: 1.12 DSI I/O Act Drv 0
1: 1.13 Flt Cfg Logic 0
1: 1.14 Flt Cfg Ref 0.0 Hz
1: 1.15 Reserved 0
1: 1.16 Reserved 0
1: 1.17 Drv 0 Addr 1
1: 1.18 Drv 1 Addr 2
1: 1.19 Drv 2 Addr 3
1: 1.20 Drv 3 Addr 4
1: 1.21 Drv 4 Addr 5
1: 1.22 Reserved 0
1: 1.23 Reserved 0
1: 1.24 PB State WAIT_PRM
For Help, press F1
Local DSI

For additional information, refer to the DriveExplorer Reference manual.

Setting the Node Address

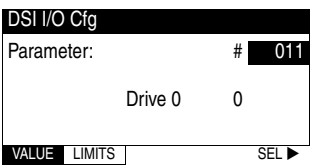
Refer to Page 2-2.

Setting the I/O Configuration

The I/O configuration determines the number of drives that will be represented on the network as one node by the adapter. If the Mode Jumper is set to the Single mode position, only one drive is represented by the adapter and **Parameter 11 - [DSI I/O Cfg]** has no effect. If the Mode Jumper J2 is set to the Multi-Drive position, up to five drives can be represented as one node by the adapter.

1. Set the value in **Parameter 11 - [DSI I/O Cfg]**:

Figure 3.1 I/O Configuration Screen on PowerFlex 4-Class HIM (22-HIM-*)



Value	Description	Mode Jumper Position	
		Single	Multi-Drive
0	Drive 0 (Default)	✓	✓
1	Drives 0-1		✓
2	Drives 0-2		✓
3	Drives 0-3		✓
4	Drives 0-4		✓

Drive 0 is the PowerFlex 40 with the 22-COMM-P adapter installed. Drive 0-1 through 0-4 are PowerFlex 4 and/or 40 drives that multi-drop to the RJ45 (RS-485) port on Drive 0. Refer to Chapter 7, Using Multi-Drive Mode for more information.

2. If a drive is enabled, configure the parameters in the drive to accept the Logic Command and Reference from the adapter. For example, set **Parameters 36 - [Start Source]** and **38 - [Speed Reference]** in a PowerFlex 40 drive to "DSI Port 5."

3. Reset the adapter. Refer to the Resetting the Adapter section in this chapter.

The adapter is ready to receive I/O from the master (i.e., scanner). You must now configure the scanner to recognize and transmit I/O to the adapter. Refer to Chapter 4, Configuring the Profibus Scanner .

Setting a Fault Action

By default, when communications are disrupted (for example, a cable is disconnected) or the master is idle, the drive responds by faulting if it is using I/O from the network. You can configure a different response to communication disruptions using **Parameter 9 - [Comm Flt Action]** and a different response to an idle scanner using **Parameter 10 - [Idle Flt Action]**.

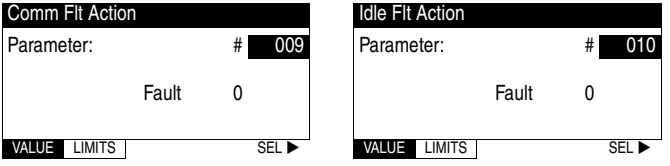
ATTENTION: Risk of injury or equipment damage exists. **Parameters 9 - [Comm Flt Action]** and **10 - [Idle Flt Action]** let you determine the action of the adapter and connected drive if communications are disrupted or the scanner is idle. By default, these parameters fault the drive. You can set these parameters so that the drive continues to run. Precautions should be taken to ensure that the settings of these parameters do not create a risk of injury or equipment damage.

To change the fault action

- Set the values of **Parameters 9 - [Comm Flt Action]** and **10 - [Idle Flt Action]** to the desired responses:

Value	Action	Description
0	Fault (default)	The drive is faulted and stopped. (Default)
1	Stop	The drive is stopped, but not faulted.
2	Zero Data	The drive is sent 0 for output data after a communications disruption. This does not command a stop.
3	Hold Last	The drive continues in its present state after a communications disruption.
4	Send Flt Cfg	The drive is sent the data that you set in the fault configuration parameters (Parameters 13 - [Flt Cfg Logic] and 14- [Flt Cfg Ref]).

Figure 3.2 Fault Action Screens on PowerFlex 4-Class HIM (22-HIM-*)



Changes to these parameters take effect immediately. A reset is not required.

If Multi-Drive mode is used, the same fault action is used by the adapter for all of the drives it controls (Drive 0, Drive 0-1 to Drive 0-4).

To set the fault configuration parameters

If you set **Parameter 9 - [Comm Flt Action]**, or **10 - [Idle Flt Action]** to the "Send Flt Cfg," the values in the following parameters are sent to the drive after a communications fault and/or idle fault occurs. You must set these parameters to values required by your application.

Number	Name	Description
13	Flt Cfg Logic	A 16-bit value sent to the drive for Logic Command.
14	Flt Cfg Ref	A 16-bit value (0 – 4000) sent to the drive as a Reference.

Changes to these parameters take effect immediately. A reset is not required.

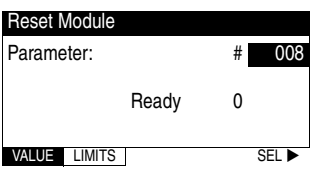
Resetting the Adapter

Changes to switch settings or some adapter parameters require that you reset the adapter before the new settings take effect. You can reset the adapter by cycling power to the drive or by using the following parameter:

ATTENTION: Risk of injury or equipment damage exists. If the adapter is transmitting control I/O to the drive, the drive may fault when you reset the adapter. Determine how your drive will respond before resetting a connected adapter.

- Set the **Parameter 08 - [Reset Module]** to **Reset Module**:

Figure 3.3 Reset Screen on PowerFlex 4-Class HIM (22-HIM-*)



Value	Description
0	Ready (Default)
1	Reset Module
2	Set Defaults

When you enter **1 = Reset Module**, the adapter will be immediately reset. When you enter **2 = Set Defaults**, the adapter will set all adapter parameters to their factory-default settings. After performing a Set Defaults, enter 1 = Reset Module so that the new values take effect. The value of this parameter will be restored to **0 = Ready** after the adapter is reset.

Viewing the Adapter Configuration

The following parameters provide information about how the adapter is configured. You can view these parameters at any time.

Number	Name	Description
01	Mode	Displays the Single or Multi-Drive operating mode selected with the jumper J2 on the adapter. Values 0 = Single drive operation 1 = Multi-Drive operation
04	P-DP Addr Actual	Profibus Node Address actually used by the adapter.
05	P-DP Rate Actual	Profibus actual operating data rate.
12	DSI I/O Actual	Displays the Drives that are active in the Multi-Drive mode. Bit Definitions: 0 = Drive 0 Active 1 = Drive 0-1 Active 2 = Drive 0-2 Active 3 = Drive 0-3 Active 4 = Drive 0-4 Active

Configuring the Profibus Scanner

Profibus scanners are available from several manufacturers, including SST. Chapter 4 provides instructions on how to utilize the SST Profibus configuration software tool to:

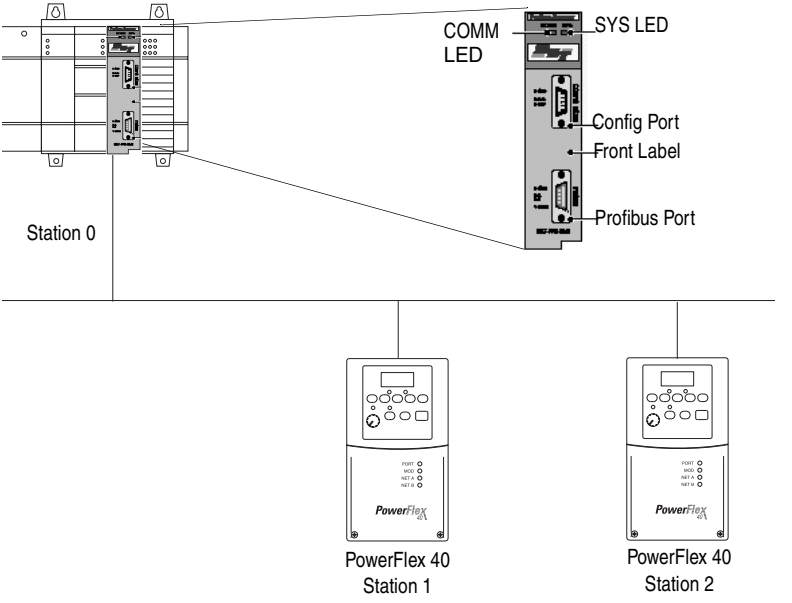
- Install the 22-COMM-P GSD file in the software tool library
- Configure the SST-PFB-SLC Profibus Scanner.

Topic	Page
Example Network	4-1
SST Profibus Configuration Software Tool	4-2
Installing the 22-COMM-P GSD file in the software tool library	4-3
Configuring the SST-PFB-SLC Profibus Scanner	4-5

Example Network

In this example, we will be configuring two **PowerFlex 40** drives, to be Station 1 and Station 2 on a Profibus network. This will be the configuration used throughout the manual. Apart from the node address and scanner mapping, they will have identical configurations.
This chapter describes the steps to configure a simple network like the network in Figure 4.1.

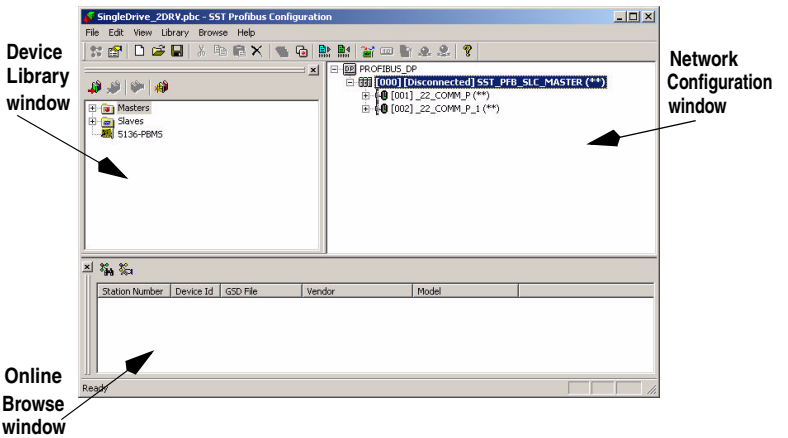
Figure 4.1 Example Profibus Network



SST Profibus Configuration Software Tool

SST Profibus scanners come with a software tool for configuring the scanner (See Figure 4.2.)

Figure 4.2 SST Profibus Configuration Software Tool



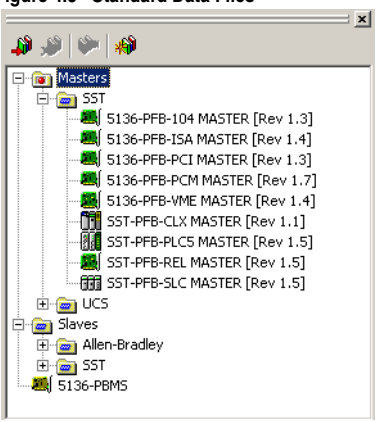
Installing the 22-COMM-P GSD file in the software tool library

GSD files are used by software tools to configure the network, i.e. to map and define the I/O in a Profibus scanner. A GSD file is required for each type of adapter on the network. For example: The 22-COMM-P GSD file is “A_B_07FF.gsd” and a copy of the file is provided on a floppy disk with each 22-COMM-P. The file can also be downloaded from the Internet by going to: www.ab.com/drives/powerflex and also www.profibus.com.

Follow the steps outlined below only when a new GSD file needs to be added to the SST Profibus Configuration Software Tool. Typically, this is only done once, after the software tool is initially installed or if configuring a 22-COMM-P on the network for the very first time with this software tool.

1. The software tool comes with standard data files as shown in Figure 4.3. Additional data files, such as the 22-COMM-P GSD file, will need to be added to configure the 22-COMM-P in the scanner.

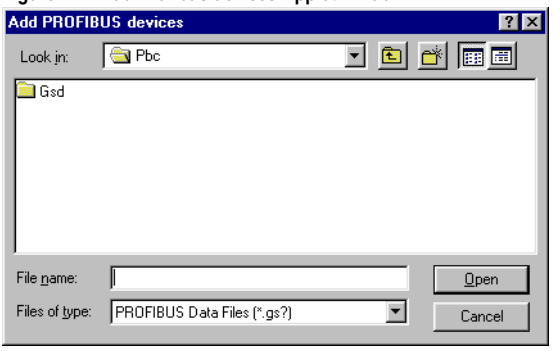
Figure 4.3 Standard Data Files



2. Click on the “New Device” icon to add GSD files to the software library tool.

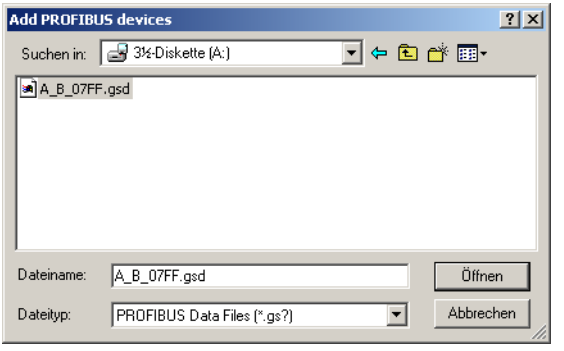
3. An “Add Profibus devices” Applet window will appear (Figure 4.4). Prompts for the location of the Profibus data files to be added to the library will follow.

Figure 4.4 Add Profibus devices Applet window.



4. Find the directory location of the data file(s) you wish to add (typically, the source location is a floppy disk in drive A:). "A_B_07FF.gsd" is the GSD file for the 22-COMM-P as shown in Figure 4.5.

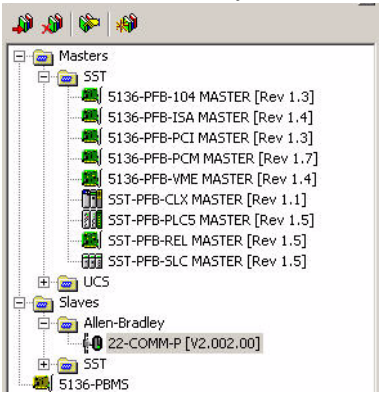
Figure 4.5 Adding the GSD file for the 22-COMM-P



5. Select "A_B_07FF.gsd" for the 22-COMM-P and click **Open**.

6. Click on the (+) sign of the Slaves folder as shown in Figure 4.6.

Figure 4.6 Masters/Slaves Library window



The software tool will automatically create an Allen-Bradley sub-folder (in the Slaves folder) if it does not already exist. The 22-COMM-P is now shown in the library and the software tool is now ready to configure a 22-COMM-P on a Profibus network.

Configuring the SST-PFB-SLC Profibus Scanner

The following steps are performed to configure the SST-PFB-SLC scanner using the SST Profibus Configuration Software Tool.
In our example, the Profibus network will consist of a SLC master and two PowerFlex 40 drives working in Single Drive mode.
The configuration example is as follows:

- Drive 0: Ctrl/Stat & Ref/Fdbk enabled
  Parameter Access enabled
- Drive 1: Ctrl/Stat & Ref/Fdbk enabled
  Parameter Access enabled

The SLC processor must be in Program mode to configure the scanner.

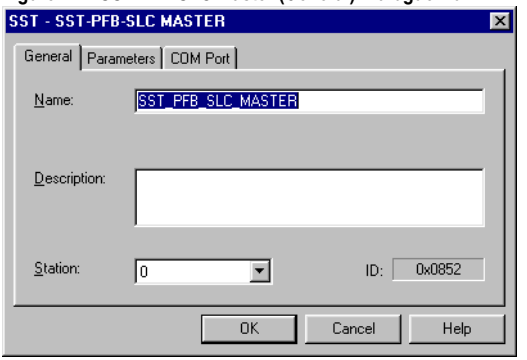
1. Click on the (+) sign of the **Masters** folder in the Library window to open the **SST** sub-folder. Available Profibus DP masters are displayed in this sub-folder.

2. Click on the (+) sign of the **Slaves** folder in the Library window and the **Allen-Bradley** sub-folder to display the available Profibus DP slaves or the 22-COMM-P slave. Refer to Figure 4.6.

3. Double-click the **SST-PFB-SLC MASTER** in the Masters folder in the Library window to add the scanner to the network.

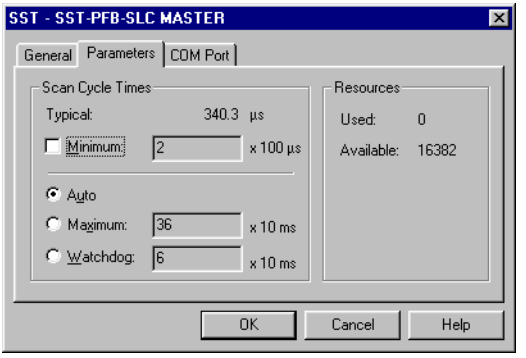
4. A user-defined **Name** and **Description** can be given to the scanner. In our example, the scanner will be **Station 0** on the network, as shown in Figure 4.7.

Figure 4.7 SST-PFB-SLC Master (General) Dialogue Box.



5. Click on the Parameters tab to view the Scan Cycle Times. In our example, use the default settings as shown in Figure 4.8.

Figure 4.8 Scan Cycle Times Dialogue Box

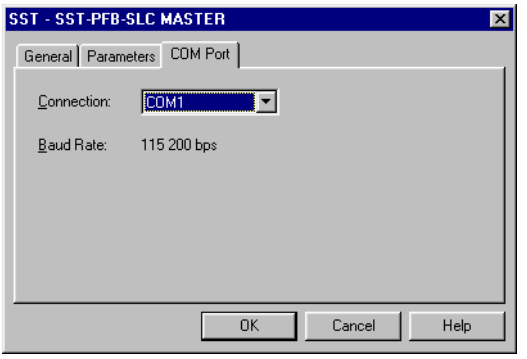


Connection and Baud Rate settings configure how the software tool will communicate with the CONFIG RS232 port on the scanner.

6. Click on the COM Port tab.

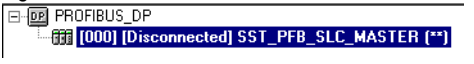
7. Accept the settings in our example (COM1 on the PC @ 115200 bps baud rate), as shown in Figure 4.9.

Figure 4.9 COM Port Default Settings



8. The scanner will appear in the network window as shown in Figure 4.10. Double-click on the scanner in the network window.

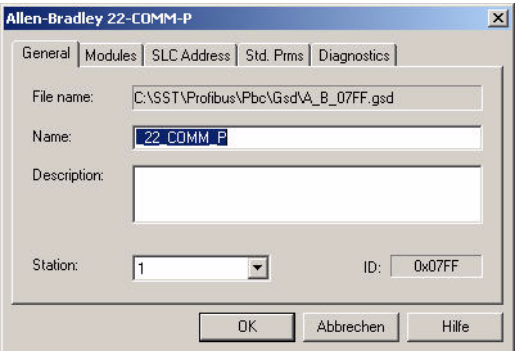
Figure 4.10 Scanner Network window



9. Double-click on the **22-COMM-P** listed in the Allen-Bradley 22-COMM-P library folder. A user-defined **Name** and **Description** can be given to this 22-COMM-P.

In our example, this device will be **Station 1** on the network. Other stations may be chosen by using the arrow to display a drop-down list in the **Station** window.

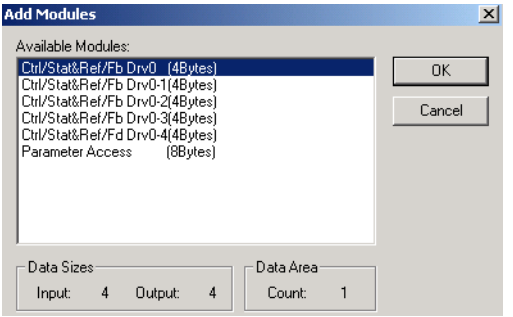
Figure 4.11 Allen-Bradley Library Dialogue window



Logic Command/Status, Reference/Feedback and Parameter Access (Parameter Data) modules are added using the Modules tab.

10. Click on the **Modules** tab. Click **Add** to view the choice of modules.

Figure 4.12 Available Modules: Ctrl/Stat & Ref/Fdbk Window



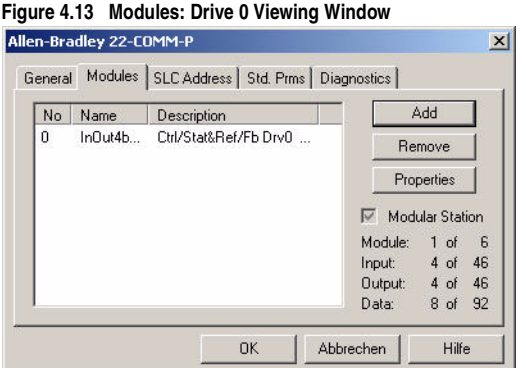
In our example, Station 1 will be controlled using Logic command/ Status and Reference/Feedback. The Parameter Access will also be used. Because the Mode Jumper J2 on the Adapter is set to "1X" for Single Drive (default) and **Parameter 11 - [DSI I/O Cfg]** is set to **Drive 0,** Logic command/Reference uses 4 bytes and Logic Status/Feedback uses 4 bytes.

Table 4.A Input/Output Size Configurations

Input Size	Output Size	Logic Command/ Status	Reference/ Feedback	Parameter 11 - [DSI I/O Cfg]	Parameter 1 - [Mode]
4	4	✔	✔	Drive 0	Single
8	8	✔	✔	Drives 0-1	Multi-Drive
12	12	✔	✔	Drives 0-2	
16	16	✔	✔	Drives 0-3	
20	20	✔	✔	Drives 0-4	

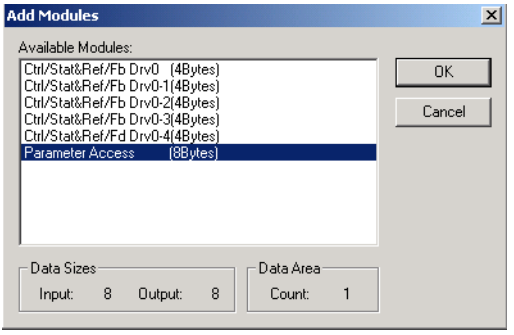
11. Select Drive 0 "Ctrl/Stat & Ref/Fdbk (2+2bytes)" from the "Available Modules" list as shown in Figure 4.12. Click **OK.** The Drive 0 "Ctrl/Stat & Ref/Fdbk" (2+2 bytes) module has now been added.

Figure 4.13 Modules: Drive 0 Viewing Window



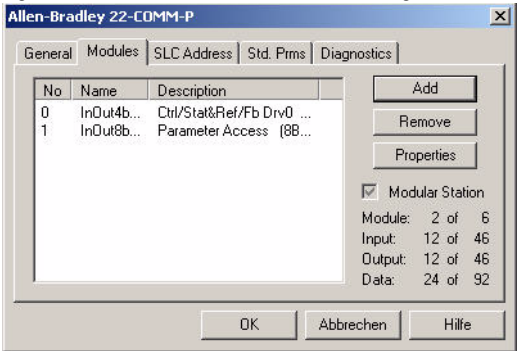
12. Click **Add** to continue adding modules.
Select “Parameter Access” and click **OK**.

Figure 4.14 Add Modules: Parameter Access Selection Window



13. The “Parameter Access” module has now been added as shown in Figure 4.15.

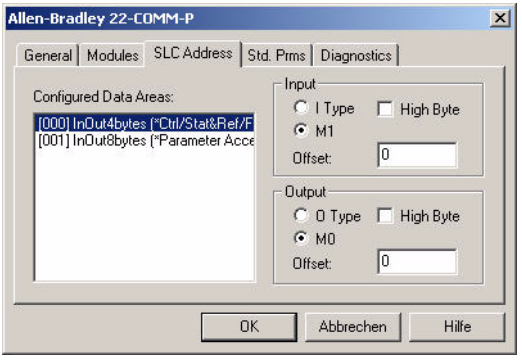
Figure 4.15 Modules: Parameter Access Viewing Window



14. Click on the **SLC Address** tab as shown in Figure 4.16. Settings can be chosen to map Station modules to SLC addresses. In our example M1/M0 files are used for Input / Output.

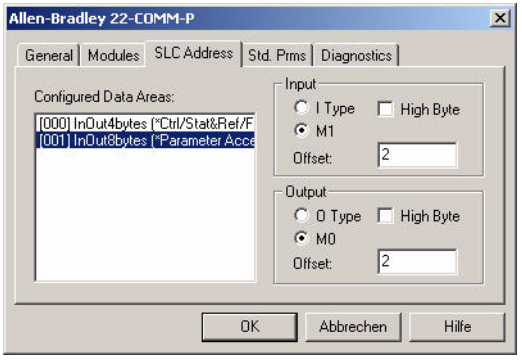
Note that the Reference/Feedback Drive 0 (Ctrl/Stat & Ref/Fdbk) starts at word 0.

Figure 4.16 SLC Address: M1/M0 (Ctrl/Stat & Ref/Fdbk)



15. Parameter Access starts at word 2 in the M1/M0 files. Note that Parameter Access utilizes 4 words. Click **OK** when finished.

Figure 4.17 SLC Address: M1/M0 (Parameter Access)



16. Station 1 is now displayed in the network window.

Figure 4.18 Station 1 Network window

Station 1 is configured as follows:

Module	M1/M0 Offset
Ctrl/Stat & Ref Fdbk Drive 0	0
Parameter Access	2

Note that Station 1 occupies 6 words.

17. The same steps for configuring Station 1 will be used for configuring Station 2. Refer to previous steps (starting at step #9, Page 4-7) for Configuring the SST-PFB-SLC Profibus Scanner-Station 2. (See Figure 4.19.)

Figure 4.19 Station 2 Network window

Station 2 is configured as follows:

Module	M1/M0 Offset
Ctrl/Stat & Ref Fdbk Drive 0	6
Parameter Access	8

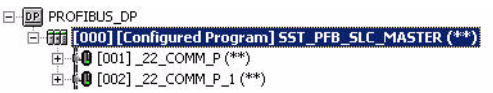
Note that Station 2 occupies 6 words.

18. Use the null modem cable that came with the scanner to connect COM1 on the PC and the CONFIG RS232 port on the scanner.

Note: The processor needs to be in program mode before proceeding.

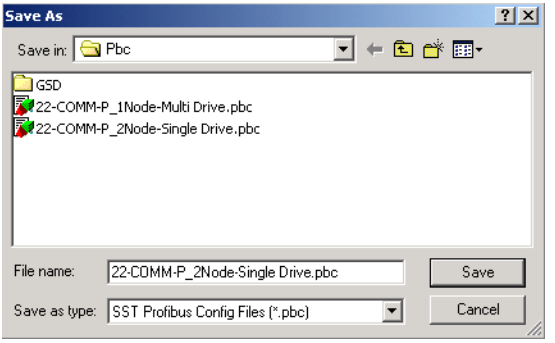
19. **Right-click** on the scanner in the network window and select "Connect". Then right-click again on the scanner in the network window and select "Load Configuration". If a minimum cycle time attention window pops up, click **OK** to continue.
After the configuration has been loaded into the scanner, "Configured Program" will be displayed in the message window. (See Figure 4.20.)

Figure 4.20 Network window scanner selection



20. Click **File** and **Save As** from the tool bar, as a unique File **Name**. The configuration of the scanner is now complete. Note that cycling power to the scanner is recommended. (See Figure 4.21.)

Figure 4.21 Save As Dialogue window



Summary of the example scanner configuration:

Module	M0 / M1 Addressing	
	Station 1	Station 2
Logic Command / Status	0	6
Reference / Feedback	1	7
Parameter Access	2	8

Using I/O Messaging

Chapter 5 provides information that explains how to use I/O Messaging to control a PowerFlex 40 drive.

Topic	Page
About I/O Messaging	5-1
Understanding the I/O Image	5-2
Using Logic Command/Status	5-2
Using Reference/Feedback	5-3

ATTENTION: Risk of injury or equipment damage exists. The examples in this publication are intended solely for purposes of example. There are many variables and requirements with any application. Rockwell Automation does not assume responsibility or liability (to include intellectual property liability) for actual use of the examples shown in this publication.

About I/O Messaging

I/O messaging is used to transfer the data which controls the PowerFlex drive and sets its reference.

The Profibus adapter provides options for configuring and using I/O, including the following:

- The size of I/O can be configured by selecting the number of attached drives (Single or Multi-Drive mode).

Chapter 3, Configuring the Adapter and Chapter 4, Using I/O Messaging discuss how to configure the adapter and scanner on the network for these options. The Glossary defines the different options. This chapter discusses how to use I/O after you have configured the adapter and scanner.

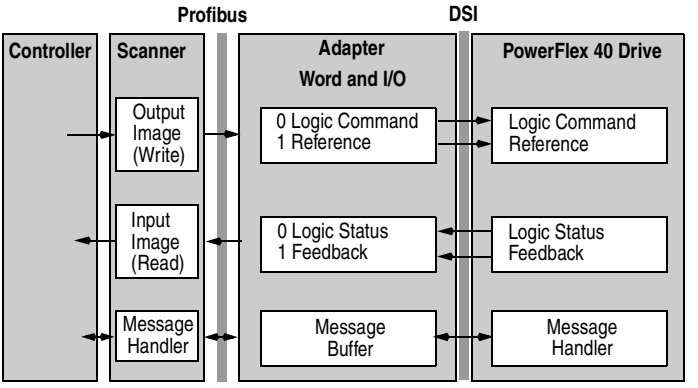
Understanding the I/O Image

The Profibus specification requires that the terms *input* and *output* be defined from the scanner's point of view. Therefore, Output I/O is data that is output from the scanner and consumed by the Profibus adapter. Input I/O is status data that is produced by the adapter and consumed as input by the scanner. The I/O image table will vary based on the:

- Configuration of the Mode Jumper (J2) on the adapter and **Parameter 11 - [DSI I/O Cfg]**. The image table always uses consecutive words starting at word 0.

Figure 5.1 illustrates an example of a Single drive I/O image (16-bit words).

Figure 5.1 Single Drive Example of I/O Image



Single drive mode is the typical configuration, where one node consists of a PowerFlex 40 drive with a 22-COMM-P adapter.

For Multi-Drive mode, where one node can consist of up to 5 drives, refer to Chapter 7, Using Multi-Drive Mode.

Using Logic Command/Status

When enabled, the Logic Command/Status word is always word 0 in the I/O image. The *Logic Command* is a 16-bit word of control produced by the scanner and consumed by the adapter. The *Logic Status* is a 16-bit word of status produced by the adapter and consumed by the scanner.

This manual contains the bit definitions for compatible products available at the time of publication in Chapter C, Logic Command/Status Words. For other products, refer to their documentation.

Using Reference/Feedback

When enabled, Reference/Feedback begins at word 1 in the I/O image. The *Reference* (16 bits) is produced by the controller and consumed by the adapter. The *Feedback* (16 bits) is produced by the adapter and consumed by the controller.

Size	Valid Values [1]	In I/O Image	Example
16-bit	0 to 4000 0.0 to 240.0 Hz (PowerFlex 4) or 0.0 to 400.0 Hz (PowerFlex 40)	Word 1	Figure 5.1

(1) The Reference for a PowerFlex 4 or 40 is set in Hz. and not in engineering units like other PowerFlex drives. For example, “300” equates to 30.0 Hz (the decimal point is always implied).

Using the Parameter Messaging

Chapter 6 provides information that explains how to use Parameter Messaging to monitor and configure the adapter and connected PowerFlex 40 drive, as well as other peripherals.

Topic	Page
About the Parameter Messaging	6-1
Running the Parameter Messaging	6-2
Parameter Protocol	6-3

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ATTENTION: Risk of equipment damage exists. If Parameter Messaging is programmed to write parameter data to Non-Volatile Storage (NVS) frequently, the NVS will quickly exceed its life cycle and cause the drive to malfunction. Do not create a program that frequently uses Parameter Messaging to write parameter data to NVS.

About the Parameter Messaging

The Parameter Messaging is used to transfer data that does not require continuous updates. With the Parameter Messaging, you can configure and monitor a slave device's parameters on the Profibus network.

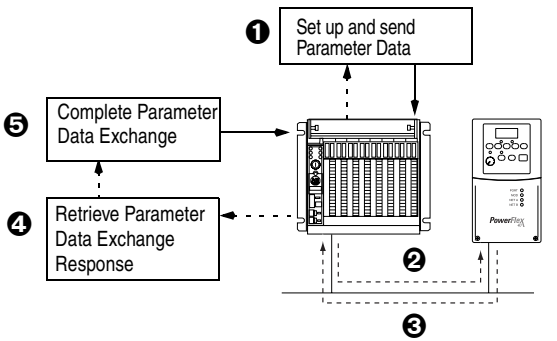
To be able to use the parameter protocols in the 22-COMM-P, the Parameter Access module must be added to the master configuration when configuring the network. Refer to step #13, Page 4-9 to view the procedure for adding the "Parameter Access" module to a configuration. This maps 4 words input and output to the end of the I/O configuration, which is used as the request/response in the parameter message format (Figure 6.2).

Running the Parameter Messaging

There are five basic events in the Parameter Data Exchange process defined below. The details of each step will vary depending on the controller. Refer to the documentation for your controller.

Important: There must be a request message and an response message for all Parameter Data, whether you are reading or writing a data.

Figure 6.1 Parameter Data Exchange Process



Event

1. You format the required data and set up the ladder logic program to send a Parameter Data Exchange request to the scanner module (download).

2. The scanner module transmits the Parameter Data Exchange Request to the slave device over the Profibus network.

3. The slave device transmits the Parameter Data Exchange Response back to the master.

4. The controller retrieves the Parameter Data Exchange Response.

5. The Parameter Data Exchange is complete.

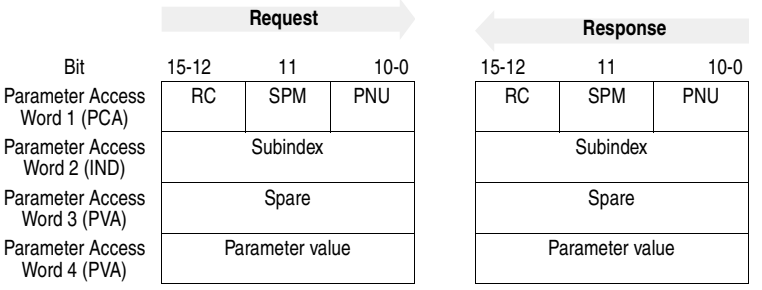
Parameter Protocol

This protocol uses 4 words in the Profibus I/O area. Requests and responses are a handshake procedure and cannot be batched, meaning that if the master sends a request, it has to wait for the response before sending a new request.

With this protocol you can:

- Read 8-bit or 16-bit parameters from any DSI port
- Write 8-bit or 16-bit parameters to any DSI port
- Read the Adapter Fault Code
- Read Events
- Read Diagnostic Items

Figure 6.2 Parameter Message Format



Refer to Parameter Message Request on page 6-4 and Parameter Message Response on page 6-5 for a description of the data that is required in each word.

Parameter Message Request

Word	Description
1	**PNU - Parameter Number** (Bit 0-10) The parameter number determines which parameter to access, in the selected peripheral. Parameters 1-1023 can be accessed. Parameter numbers 1024 - 2047 are used to access the fault object. Parameter 1024 is equal to the latest fault, 1025 to the prior fault, and so on Bit definitions 1-1023 Parameters (Drive or Adapter) 1024 Adapter Fault Code 1025-1056 Adapter Events 1280-1289 Diagnostic Items (Single Drive) 1280-1304 Diagnostic Items (Multi Drive)
	SPM - Spontaneous Message (Bit 11) Reserved - Should always bet set to 0.
	RC - Request/Response Code (Bit 12-15) One of the following codes have to be used: 0 = No request 1 = Request parameter value 2 = Change parameter value (8-bit & 16-bit word) 3 = Spare 4 = Parameter minimum 5 = Parameter maximum 6 = default value 7 -15 = Reserved
2	**IND - Index** The IND is used to specify which drive we intend to send a message 0 - 2 bits = DSI port Bit definitions 0 0 0 Drive 0 single drive mode 0 0 1 Drive 0-1 multi-drive mode 0 1 0 Drive 0-2 multi-drive mode 0 1 1 Drive 0-3 multi-drive mode 1 0 0 Drive 0-4 multi-drive mode 1 0 1 Adapter 3 - 15 = Reserved
3	**PVA - Parameter value** Spare
4	**PVA - Parameter value** (8-bit & 16-bit word) Read Request: Not used Write Request: Contents the write value for a 8-bit or 16-bit parameter.

Parameter Message Response

Word	Description
1	**PNU - Parameter Number** (Bit 0-10) Requested parameter number.
	SPM - Spontaneous Message (Bit 11) Reserved - is always set to 0.
	RC - Request/Response Code (Bit 12-15) One of the following codes will be sent: 0 = No request 1 = Transfer parameter value (8-bit & 16-bit word) 2 = Spare 3-6 = Reserved 7 = Request rejected (including Adapter Fault Code and Parameter Message Fault Code, see table below) 9-15 = Reserved
2	**IND - Index** Port ID of requested parameter
3	**PVA - Parameter value** Spare
4	**PVA - Parameter value** (8-bit & 16-bit word) Read Response: Contents the value from a 8-bit or 16-bit parameter, or the Fault Code (if RC="7"). Write Response: Confirms the write value for a 8-bit or 16-bit parameter, or the Fault Code (if RC="7")

Adapter Fault Code

Code	Description
51	DSI port watchdog
52	Profibus network loss
53	Not compatible product
54	DSI time-out or additional DSI master connected

Parameter Message Fault Code

Code	Description
101	Service not supported (i.e., Set service to a read-only parameter)
102	Service not valid
104	Parameter does not exist (i.e., Parameter number>max number of parameters)
106	Data value out of range (i.e., Set value is out of range)
107	State conflict (i.e., Parameter is not changeable while the product is in an operating state)

Using Multi-Drive Mode

Chapter 7 provides information to explain how to use Multi-Drive mode.

Topic	Page
Single Mode vs. Multi-Drive Mode	7-1
System Wiring	7-4
Understanding the I/O Image	7-5
Configuring the RS-485 (DSI) Network	7-6
Multi-Drive Mode Parameter Data	7-7
Additional Information	7-7

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Single Mode vs. Multi-Drive Mode

The DSI interface provides a means to connect up to five drives on one node daisy-chained over the RS-485 interface. Two different operation modes, single and multiple drive modes, are possible.

Single-Drive mode is a typical network installation, where a single Profibus node consists of a single drive with a 22-COMM-P adapter (Figure 7.1). In this mode, the adapter can talk to one host, and the host can support one additional external peripheral (HIM or 22-SCM-232) over DSI.

Figure 7.1 Single Mode Example for Network

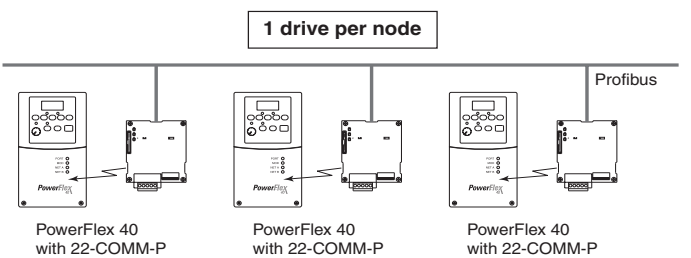
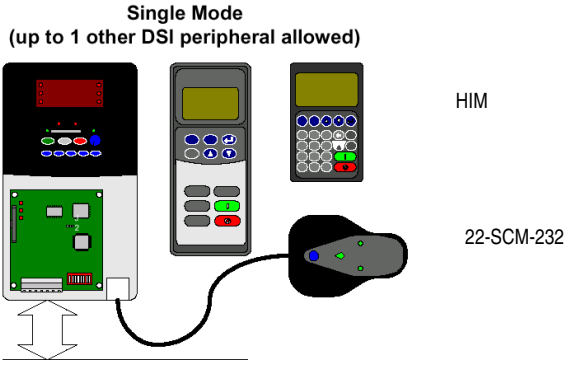


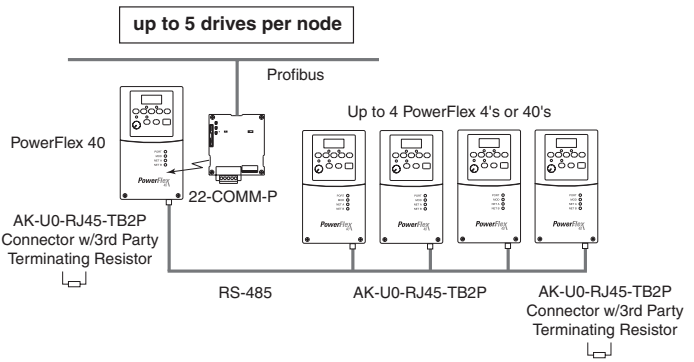
Figure 7.2 shows that the Single Drive mode provides the possibility of connecting one additional external peripheral.

Figure 7.2 DSI peripheral devices for Single Mode Connection



Multi-Drive mode is an alternative to the typical network installation, where a single Profibus node can consist of one to five drives (Figure 7.3). The first drive must be a PowerFlex 40 with a 22-COMM-P adapter. The remaining drives can be PowerFlex 4 or 40 drives and they are daisy-chained over RS-485 with the first drive.

Figure 7.3 Multi-Drive Mode Example for Network



The multiple drive connectivity, up to five drives with at least one PowerFlex 40 drive, for example, one PowerFlex 40 and four PowerFlex4 drives, provides a low cost Profibus solution in the industry for multiple drives.

In this case, the unit will not operate with DSI peripheral devices such as the HIM or the 22-SCM-232 and the application of any other peripheral will be prohibited.

Benefits of Multi-Drive mode include:

- Lower hardware costs. Only one 22-COMM-P adapter is needed for up to five drives. PowerFlex 4's can also be used for the daisy-chained drives instead of PowerFlex 40's.
- Reduces the network node count.
  For example, in Single mode 30 drives would consume 30 nodes. In Multi-Drive mode, 30 drives can be connected in 6 nodes.
- Provides a means to put PowerFlex 4's on Profibus (PowerFlex 4's do not have an internal communications adapter slot).
- Controller can control, monitor, and read/write parameters for all five drives.

The trade-offs of Multi-Drive mode include:

- If the PowerFlex 40 with the 22-COMM-P adapter is powered down, then communications with the daisy-chained drives are disrupted and the drives will take the appropriate communications loss action set in each drive.
- Communications throughput to the daisy-chained drives will be slower than if each drive was a separate node on Profibus (Single mode). This is because the 22-COMM-P adapter must take the Profibus data for the other drives and sequentially send the respective data to each drive over RS-485.
- Since the RS-485 ports are used for daisy-chaining the drives, there is no connection for a peripheral device such as a HIM. The AK-U0-RJ45-SC1 DSI Splitter cable cannot be used to add a second connection for a peripheral device.

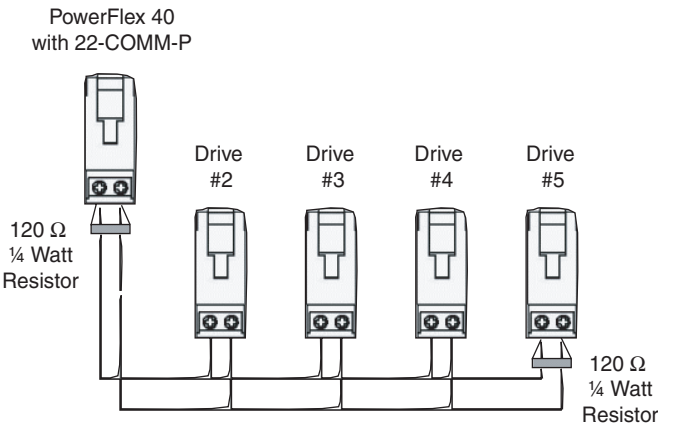
System Wiring

To daisy-chain the drives off the PowerFlex 40 with the 22-COMM-P adapter (Drive 0), the AK-U0-RJ45-TB2P terminal block connector (Figure 7.4) can be used for easy installation.

Figure 7.4 AK-U0-RJ45-TB2P Terminal Block Connector

The wiring diagram for using AK-U0-RJ45-TB2P terminal block connectors is shown in Figure 7.5.

Figure 7.5 AK-U0-RJ45-TB2P Connector Wiring Diagram



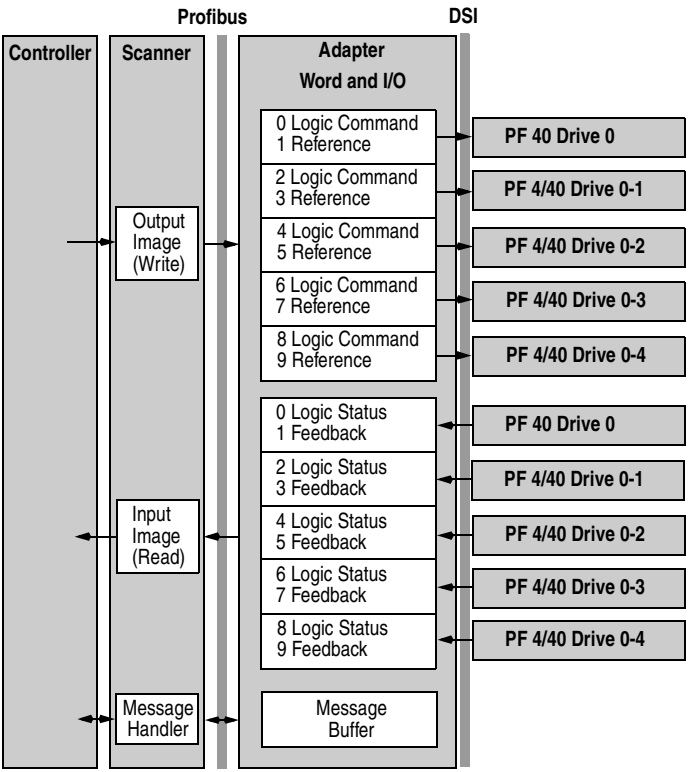
Understanding the I/O Image

The Profibus specification requires that the terms *input* and *output* be defined from the scanner's point of view. Therefore, Output I/O is data that is output from the scanner and consumed by the Profibus adapter. Input I/O is status data that is produced by the adapter and consumed as input by the scanner. The I/O image table will vary based on the:

- Configuration of the Mode Jumper (J2) on the adapter and **Parameter 11 - [DSI I/O Cfg]**. The image table always uses consecutive words starting at word 0.

Figure 7.6 illustrates the Multi-Drive I/O image with 16-bit words.

Figure 7.6 Multi-Drive Example of I/O Image



Configuring the RS-485 (DSI) Network

The following parameters must be set in the daisy-chained drives:

Parameter	Value
P36 - [Start Source]	5 (“RS485 [DSI] Port”)
P38 - [Speed Reference]	5 (“RS485 [DSI] Port”)
A103 - [Comm Data Rate]	4 (“19.2kbps”)
A104 - [Comm Node Addr]	1-247 (must be unique)
A107 - [Comm Format]	0 (“RTU 8-N-1”)

Important: **Parameter A105 - [Comm Loss Action]** in the daisy-chained drives is still used in Multi-Drive mode. If the RS-485 cable is disconnected or broken, the disconnected drive(s) will immediately take the corresponding Comm Loss Action(s). **Parameter A106 - [Comm Loss Time]** is not used in Multi-Drive mode. On the Profibus side, **Parameters 09 - [Comm Flt Action]** and **10 - [Idle Flt Action]** in the 22-COMM-P determine the action taken for ALL of the drives on the Multi-Drive node.

The following Multi-Drive parameters must be set in the 22-COMM-P:

Parameter	Value
11 - [DSI I/O Cfg]	0 = Drive 0 connected 1 = Drives 0-1 connected 2 = Drives 0-2 connected 3 = Drives 0-3 connected 4 = Drives 0-4 connected
17 - [Drv 0 Addr]	= Parameter A104 - [Comm Node Address] in Drive 0
18 - [Drv 1 Addr]	= Parameter A104 - [Comm Node Address] in Drive 0-1
19 - [Drv 2 Addr]	= Parameter A104 - [Comm Node Address] in Drive 0-2
20 - [Drv 3 Addr]	= Parameter A104 - [Comm Node Address] in Drive 0-3
21 - [Drv 4 Addr]	= Parameter A104 - [Comm Node Address] in Drive 0-4

After setting the 22-COMM-P parameters, set the adapter Mode Jumper from Single drive operation to Multi-Drive operation, and reset the adapter or cycle power. Refer to Chapter 2, Commissioning the Adapter.

Important: 22-COMM-P parameters can be set using a DSI peripheral (HIM, DriveExplorer with 22-SCM-232, etc.) ONLY when the Mode Jumper is in the Single mode position.

Multi-Drive Mode Parameter Data

Parameter addressing for Parameter Data in Multi-Drive is similar to that in Single mode.
The parameter numbers (PNU) range from 1 to 2047. The parameter numbers 1-1023 are used to access the drive or adapter parameters, parameter numbers 1024-2047 are for accessing the Adapter Fault Codes, Events and Diagnostic Items.
For details of accessing the drive parameters of Multi-Drives, see Parameter Message Request on page 6-4.

Example: The parameter messaging accesses the drive **Parameter 39 - [Accel Time]** for Drive 0 to Drive 4 in Multi-Drive mode.

Accessing Parameter 39 - [Accel Time]

Module	**IND** (0 - 2 bits)	PNU
Drive 0 Single Drive	0 0 0	39
Drive 0-1 Multi Drive	0 0 1	39
Drive 0-2 Multi Drive	0 1 0	39
Drive 0-3 Multi Drive	0 1 1	39
Drive 0-4 Multi Drive	1 0 0	39

Additional Information

- When the PowerFlex 40 with the 22-COMM-P (Drive 0) is powered up, all configured daisy-chained drives must be present before an I/O connection is allowed on Profibus (i.e. before the drives can be controlled).
- If the PowerFlex 40 with the 22-COMM-P adapter (Drive 0) is powered down, communications with the four daisy-chained drives (Drive 0-1 to Drive 0-4) are disrupted and the drives will fault.
- If any of the daisy-chained drives (Drive 0-1 to Drive 0-4) is powered down, the respective Input Image (Logic Status and Feedback) sent to the scanner will be zeros, and the MOD LED on the 22-COMM-P adapter will flash red. Status information from the scanner will not indicate there is a fault at the node.

Troubleshooting

Chapter 8 contains troubleshooting information.

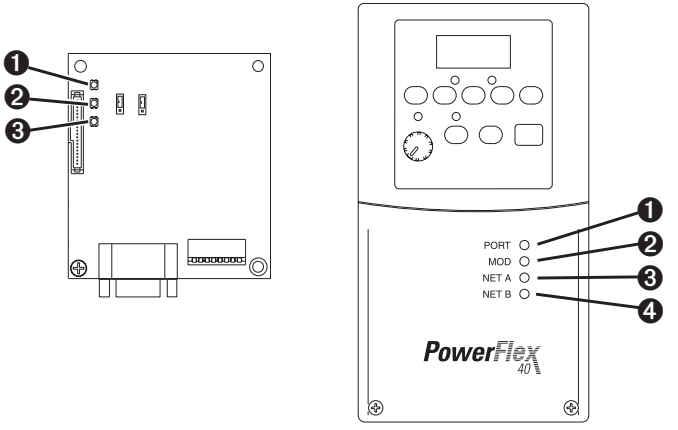
Topic	Page
Locating the Status Indicators	8-1
PORT Status Indicator	8-2
MOD Status Indicator	8-3
Net A Status Indicator	8-4

Topic	Page
Adapter Diagnostic Items in Single Drive Mode	8-4
Adapter Diagnostic Items in Multi-Drive Mode	8-5
Viewing and Clearing Events	8-6

Locating the Status Indicators

The Profibus adapter has three status indicators. They can be viewed on the adapter or through the drive cover. See Figure 8.1.

Figure 8.1 Status Indicators *(location on drive may vary)*



Number	Status Indicator	Description	Page
❶	PORT	DSI Connection Status	8-2
❷	MOD	Adapter Status	8-3
❸	NET A	Profibus Status	8-4
❹	NET B	Not Used for Profibus	

PORT Status Indicator

Status	Cause	Corrective Action
Off	The adapter is not powered or is not connected properly to the drive.	• Securely connect the adapter to the drive using the ribbon cable. • Apply power to the drive.
Flashing Red	The adapter is not receiving a ping message from the drive.	• Verify that cables are securely connected. • Cycle power to the drive.
Solid Red	The drive has refused an I/O connection from the adapter. Another DSI peripheral is using the same DSI port as the adapter.	**Important:** Cycle power to the product after making the following correction: • Verify that all DSI cables are securely connected and not damaged. Replace cables if necessary. • Check the Events, replace the adapter with a compatible A-B branded product (22-COMM-P)
Flashing Green	not used	
Solid Green	The adapter is properly connected and is communicating with the drive.	No Action.
Solid Orange	The adapter is booting.	Wait until boot program has been finished
Flashing Orange	The adapter is in flash mode (SW8 down). Application failure	• Wait until Firmware Update has been finished, then switch SW8 to 1. • Download Application code

MOD Status Indicator

Status	Cause	Corrective Action
Off	The adapter is not powered.	• Securely connect the adapter to the drive using the ribbon cable. • Apply power to the drive.
Flashing Red	The adapter has faults or a drive is missing in Multi Drive mode.	• Clear faults in the drive. • Disconnect additional DSI peripheral and cycle power to the drive. • If cycling power does not correct the problem, the parameter settings may have been corrupted. Reset defaults and reconfigure the module. • If resetting defaults does not correct the problem, flash the adapter with the latest firmware release. • For Multi-Drive mode, determine which drive is missing or faulted. Check cabling and configuration settings (see Configuring the RS-485 (DSI) Network section in Chapter 7).
Solid Red	The adapter has failed the hardware test.	• Cycle power to the drive. • Replace the adapter.
Flashing Green	The adapter is operational but is not transferring I/O data.	• Place the scanner in RUN mode. • Configure the adapter for the program in the controller. • Program the controller to recognize and transmit I/O to the adapter.
Solid Green	The adapter is operational and transferring I/O data.	No Action.

Net A Status Indicator

Status	Cause	Corrective Actions
Off	The adapter is not powered or is not connected properly to the network or the Node Address is wrong.	• Securely connect the adapter to the drive using the Internal Interface cable and to the network using a Profibus cable. (Screw D-shell to the adapter). • Check the SW8 of DIP-Switches and set it to one - Normal operating state. • Check the DIP-Switches (SW1~SW7) node address and the Scanner setting. • Apply power to the drive.
Flashing Red	Error in Profibus configuration.	• Re-configure the Profibus module.
Solid Red	not used	
Flashing Green	not used	
Solid Green	The adapter is properly connected and communicating on the network.	No action required.

Note: For the Multi Drive mode, disconnecting a DSI cable from a daisy-chained drive does not lead to an error! There is no indication in the adapter that a drive is missing, except that commands to the missing drive have no effect.

Adapter Diagnostic Items in Single Drive Mode

The following diagnostic items can be accessed using DriveExplorer (version 3.01 or higher).

No.	Name	Description
1	Field Flash Cnt	The number of Firmware Updates.
2	Adapter Events	The number of events in the event queue.
3	Reference	Reference from Profibus returned to DSI drive.
4	Logic Cmd	Command from Profibus returned to DSI drive.
5	Logic Sts	Status of the drive returned to Profibus.
6	Feedback	Feedback from drive returned to Profibus.
7	Profibus Rx Errors	Current value of the Profibus Receive Error Counter register.
8	Profibus Tx Errors	Current value of the Profibus Transmit Error Counter register.
9	Data Rate	Current setting of the Profibus baud rate.
10	Node Address	Current setting of the adapter Node address switch.

Adapter Diagnostic Items in Multi-Drive Mode

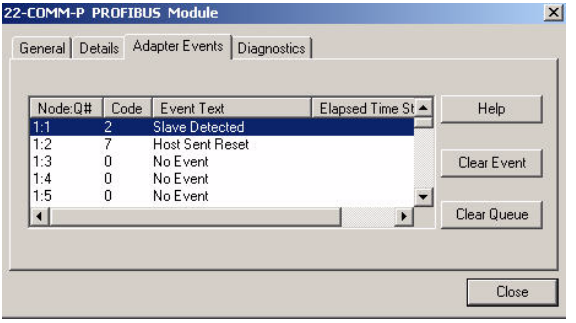
For the Multi Drive Mode it is not possible to connect a peripheral device such as a HIM or 22-SCM-232 (DriveExplorer). Therefore in Multi Drive Mode the following adapter diagnostic items can only be accessed via Profibus network.

No.	Name	Description
1	Field Flash Cnt	The number of Firmware Updates.
2	Adapter Events	The number of events in the event queue.
3	Drv 0 Reference	Reference from Profibus returned to DSI Drive 0.
4	Drv 0 Logic Cmd	Command from Profibus returned to DSI Drive 0.
5	Drv 0 Logic Sts	Status of the Drive 0 returned to Profibus.
6	Drv 0 Feedback	Feedback from Drive 0 returned to Profibus.
7	Drv 1 Reference	Reference from Profibus returned to DSI Drive 0-1.
8	Drv 1 Logic Cmd	Command from Profibus returned to DSI Drive 0-1.
9	Drv 1 Logic Sts	Status of the Drive 0-1 returned to Profibus.
10	Drv 1 Feedback	Feedback from Drive 0-1 returned to Profibus.
11	Drv 2 Reference	Reference from Profibus returned to DSI Drive 0-2.
12	Drv 2 Logic Cmd	Command from Profibus returned to DSI Drive 0-2.
13	Drv 2 Logic Sts	Status of the Drive 0-2 returned to Profibus.
14	Drv 2 Feedback	Feedback from Drive 0-2 returned to Profibus.
15	Drv 3 Reference	Reference from Profibus returned to DSI Drive 0-3.
16	Drv 3 Logic Cmd	Command from Profibus returned to DSI Drive 0-3.
17	Drv 3 Logic Sts	Status of the Drive 0-3 returned to Profibus.
18	Drv 3 Feedback	Feedback from Drive 0-3 returned to Profibus.
19	Drv 4 Reference	Reference from Profibus returned to DSI Drive 0-4.
20	Drv 4 Logic Cmd	Command from Profibus returned to DSI Drive 0-4.
21	Drv 4 Logic Sts	Status of the Drive 0-4 returned to Profibus.
22	Drv 4 Feedback	Feedback from Drive 0-4 returned to Profibus.
23	Profibus Rx Errors	Current value of the Profibus Receive Error Counter register.
24	Profibus Tx Errors	Current value of the Profibus Transmit Error Counter register.
25	Active drives number	The number of active slave drives.

Viewing and Clearing Events

The adapter maintains an event queue that reports the history of its actions. You can view the event queue using DriveExplorer (3.01).

Figure 8.2 DriveExplorer Event View/Clear Screen



Events

Many events in the Event queue occur under normal operation. If you encounter unexpected communications problems, the events may help you or Rockwell Automation personnel troubleshoot the problem. The following events may appear in the event queue:

Code	Event	Description
0	No Event	Text displayed in an empty event queue entry.
1	EEPROM Sum Flt	Startup sequence detected corrupt EEPROM storage in the adapter.
2	Slave Detected	A DSI slave was detected on the slave I/O line
3	Slave Removed	A DSI slave was removed on the slave I/O line
7	Bad I/O Config	The actual connected drives are different from I/O configuration (Adapter Parameter 11)
8	Host Timeout	An Parameter Data to a Drive Host timed out waiting for a response.
9	Slave Timeout	An Param. Data to a Slave timed out waiting for a response.
10	Bad Host Flt	The adapter was connected to an incompatible product.
11	DSI Bus Off Flt	A bus-off condition was detected on DSI. This event may be caused by loose or broken cables or by noise.
13	P-DP Idle	The Profibus Adapter received a Network Clear from the Profibus Master.
14	P-DP Online	The Profibus adapter has gone on-line the Profibus Network.
15	P-DP Offline	The Profibus adapter has gone off-line the Profibus Network.
17	DSI Fault Msg	The Host faulted
18	DSI Fault Clear	The user cleared a fault in the adapter
19	Not COMM Flt	The adapter detected a fault condition on the PB network
21	Program damage	The Checksum of the Program is wrong

Specifications

This chapter present the specifications for the adapter.

Topic	Page
Communications	A-1
Electrical	A-1
Mechanical	A-1
Environmental	A-2
Regulatory Compliance	A-2

Communications

Network	
Protocol	Profibus
Data Rates	9.6kbps, 19.2kbps, 93.75kbps, 187.5kbps, 500kbps, 1.5Mbps, 3Mbps, 6Mbps, 12Mbps. The adapter has an auto baud rate detection.
Drive	
Protocol	DSI

Electrical

Consumption	
Drive	370 mA at 5V supplied through the drive.
Network	

Mechanical

Dimensions	
Height	19 mm (0.75 inches)
Length	86 mm (3.39 inches)
Width	78.5 mm (3.09 inches)
Weight	57 g (2 oz.)

Environmental

Temperature Operating Storage	 -10 to +50 °C (14 to 149 °F) -40 to +85 °C (-40 to +185 °F)
Relative Humidity	-5 to 95% non-condensing
Vibration	1.0 G Operational 2.5 G Non-operational
Shock	15.0 G Operational 30.0 G Non-operational
Altitude	1,000 m (3,300 ft.) without derating

Regulatory Compliance

Certification	Specification
UL	UL508C
CE	EN50178 and EN61800-3

Adapter Parameters

Appendix B provides information about the Profibus adapter parameters.

Topic	Page
About Parameter Numbers	B-1
Parameter List	B-1

About Parameter Numbers

The parameters in the adapter are numbered consecutively. However, depending on which configuration tool you use, they may have different numbers.

Configuration Tool	Numbering Scheme
• DriveExplorer • DriveTools SP • HIM	The adapter parameters begin with parameter 1. For example, Parameter 04 - [P-DP Addr Actual] is parameter 04 as indicated by this manual.

Parameter List

Parameter No.	Name and Description	Details	
01	**[Mode]** Displays the Single or Multi-Drive operating mode selected with the jumper J2 on the adapter.	Default: Values: Type:	N/A 0 = Single Drive 1 = Multiple Drive Read Only
04	**[P-DP Addr Actual]** Profibus Node Address actually used by the adapter.	Default: Minimum: Maximum: Type:	N/A 00 127 Read Only
05	**[P-DP Rate Actual]** PROFIBUS actual operating data rate.	Default: Values: Type:	N/A 0 = 9.6 kbps 1 = 19.2 kbps 2 = 45.45 kbps 3 = 93.75 kbps 4 = 187.5 kbps 5 = 500 kbps 6 = 1.5 Mbps 7 = 3 Mbps 8 = 6 Mbps 9 = 12 Mbps 10 = Off-line Read Only

Parameter No.	Name and Description	Details	
08	**[Reset Module]** No action if set to "Ready." Resets the adapter if set to "Reset Module." Restores the adapter to its factory default settings if set to "Set Defaults." This parameter is a command. It will be reset to "0 = Ready" after the command has been performed.	Default: Values Type: Reset Required:	0 = Ready 0 = Ready 1 = Reset Module 2 = Set Defaults Read/Write No
	ATTENTION: Risk of injury or equipment damage exists. If the adapter is transmitting I/O that controls the drive, the drive may fault when you reset the adapter. Determine how your drive will respond before resetting a connected adapter.		
09	**[Comm Flt Action]** Action that the adapter and drive take if the adapter detects that Profibus Communications have been disrupted. This setting is effective only if I/O that controls the drive is transmitted through the adapter.	Default: Values: Type: Reset Required:	0 = Fault 0 = Fault 1 = Stop 2 = Zero Data 3 = Hold Last 4 = Send Flt Cfg Read/Write No
	ATTENTION: Risk of injury or equipment damage exists. **Parameter 09- [Comm Flt Action]** and **Parameter 10- [Idle Flt Action]** lets you determine the action of the adapter and connected drive if the scanner is idle. By default, these parameters fault the drive. You can set these parameters so that the drive continues to run. Precautions should be taken to ensure that the setting of these parameter does not create a hazard of injury or equipment damage.		
10	**[Idle Flt Action]** Sets the action that the adapter and drive take if the adapter detects that scanner is idle because the controller was switched to program mode. This setting is effective only if I/O that controls the drive is transmitted through the adapter.	Default: Values: Type: Reset Required:	0 = Fault 0 = Fault 1 = Stop 2 = Zero Data 3 = Hold Last 4 = Send Flt Cfg Read/Write No
11	**[DSI I/O Cfg]** Sets the configuration of the Drives that are active in the Multi-Drive mode. Identifies the connections that would be attempted on a reset or power cycle.	Default: Values: Type: Reset Required:	0 0 = Drive 0 1 = Drives 0-1 2 = Drives 0-2 3 = Drives 0-3 4 = Drives 0-4 Read/Write Yes
12	**[DSI I/O Actual]** Displays the Drives that are active in the Multi-Drive mode.	Default: Bit Values: Type:	N/A 0 = Drive 0 1 = Drives 0-1 2 = Drives 0-2 3 = Drives 0-3 4 = Drives 0-4 Read Only

Parameter No.	Name and Description	Details
13	**[Flt Cfg Logic]** Sets the Logic Command data that is sent to the drive if any of the following is true: • Parameter 09 - [Comm Flt Action] is set to Send Flt Cfg and communications are disrupted. • Parameter 10 - [Idle Fault Action] is set to Send Flt Cfg and the scanner is put into Program mode. The bit definitions will depend on the product to which the adapter is connected.	Default: 0000 0000 0000 0000 Minimum: 0000 0000 0000 0000 Maximum: 1111 1111 1111 1111 Type: Read/Write Reset Required: No
14	**[Flt Cfg Ref]** Sets the Reference data that is sent to the drive if any of the following is true: • Parameter 09- [Comm Flt Action] is set to Send Flt Cfg and communications are disrupted. • Parameter 10 - [Idle Flt Action] is set to Send Flt Cfg and the scanner is put into Program mode.	Default: 0 Minimum: 0 Maximum: 4000 Type: Read/Write Reset Required: No **Important:** If the drive uses a 16-bit Reference, the most significant word of this value must be set to zero (0) or a fault will occur.
17 18 19 20 21	**[Drv 0 Addr]** **[Drv 1 Addr]** **[Drv 2 Addr]** **[Drv 3 Addr]** **[Drv 4 Addr]** Sets the corresponding node addresses of the daisy-chained drives when the adapter Mode Jumper (J2) is set for Multi-Drive operation. **Important:** The settings for these parameters must match the Parameter A104 - [Comm Node Addr] settings in the respective drives. Each setting must also be unique (no duplicate node address).	Default: 1 Default: 2 Default: 3 Default: 4 Default: 5 Minimum: 1 Maximum: 127 Type: Read/Write Reset Required: Yes
24	**[P-DP State]** Displays the state of the Profibus controller.	Default: N/A Values: 0 = WAIT_PRM 1 = WAIT_CFG 2 = DATA_EX 3 = ERROR Type: Read Only

Notes:

Logic Command/Status Words

Appendix C provides the definitions of the Logic Command/Logic Status words that are used for some products that can be connected to the Profibus adapter. If you do not see the Logic Command/Logic Status for the product that you are using, refer to your product's documentation.

PowerFlex 4 and PowerFlex 40 Drives

Logic Command Word

Logic Bits																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	**Command**	**Description**
															x	Stop	0 = Not Stop 1 = Stop
														x		Start*	0 = Not Start 1 = Start
													x			Jog	0 = Not Jog 1 = Jog
												x				Clear Faults	0 = Not Clear Faults 1 = Clear Faults
										x	x					Direction	00 = No Command 01 = Forward Command 10 = Reverse Command 11 = Change Direction (toggle)
									x							Not used	
								x								MOP Increment	0 = Not Increment 1 = Increment
						x	x									Accel Rate	00 = No Command 01 = Accel Rate 1 Command 10 = Accel Rate 2 Command 11 = Hold Accel Rate
				x	x											Decel Rate	00 = No Command 01 = Decel Rate 1 Command 10 = Decel Rate 2 Command 11 = Hold Decel Rate
	x	x	x													Reference Select	000 = No Command 001 = Freq Source = Select 010 = Freq Source = Int. Freq 011 = Freq Source = Comm 100 = Preset Freq 1 101 = Preset Freq 2 110 = Preset Freq 3 111 = Preset Freq 4
x																MOP Decrement	0 = Not Decrement 1 = Decrement

* A 0 = Not Stop condition (logic 0) must first be present before a 1 = Start condition will start the drive.

PowerFlex 4 and PowerFlex 40 Drives

Logic Status Word

Logic Bits																	
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	**Status**	**Description**
															x	Ready	0 = Not Ready 1 = Ready
														x		Active	0 = Not Active 1 = Active
													x			Command Direction	0 = Reverse 1 = Forward
												x				Actual Direction	0 = Reverse 1 = Forward
											x					Accel	0 = Not Accelerating 1 = Accelerating
										x						Decel	0 = Not Decelerating 1 = Decelerating
									x							Alarm	0 = No Alarm 1 = Alarm
								x								Fault	0 = No Fault 1 = Fault
							x									At Speed	0 = Not At Reference 1 = At Reference
						x										Main Freq	0 = Not Controlled By Comm 1 = Controlled By Comm
					x											Operation Command	0 = Not Controlled By Comm 1 = Controlled By Comm
				x												Parameters	0 = Not Locked 1 = Locked
			x													Digital Input 1 Status	
		x														Digital Input 2 Status	
	x															Digital Input 3 Status (1)	
x																Digital Input 4 Status (1)	

(1) This status is available only with firmware revision FRN 2.xx and higher.

SLC Ladder Logic Examples

Appendix D provides examples that explain how to use a SLC controller to send I/O Messaging to control, configure and monitor a PowerFlex 40 drive in Single Drive and Multi Drive mode.

Topic	Page
Single Drive Example	D-2
Multi Drive Example	D-9

Single Drive Example

Figure D.1 Main Routine

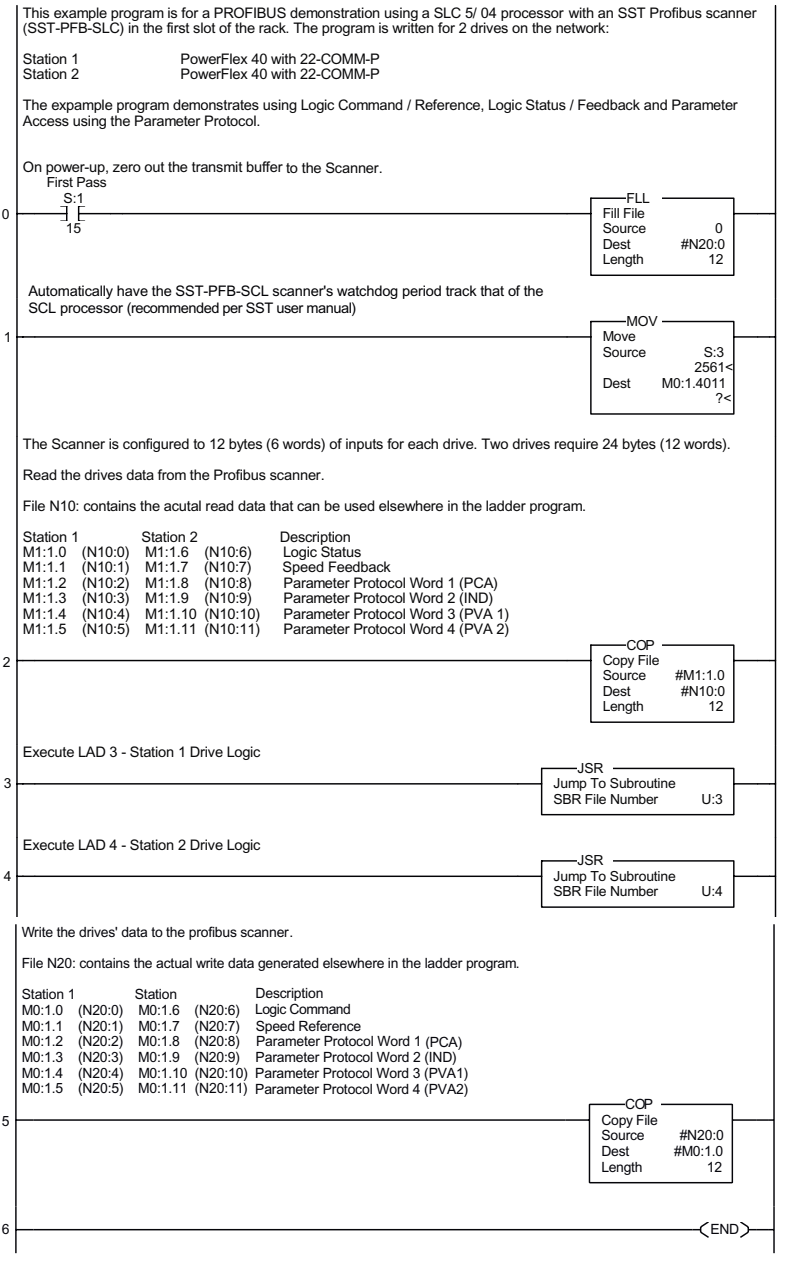

This example program is for a PROFIBUS demonstration using a SLC 5/ 04 processor with an SST Profibus scanner (SST-PFB-SLC) in the first slot of the rack. The program is written for 2 drives on the network:
Station 1 PowerFlex 40 with 22-COMM-P
Station 2 PowerFlex 40 with 22-COMM-P
The expample program demonstrates using Logic Command / Reference, Logic Status / Feedback and Parameter Access using the Parameter Protocol.
On power-up, zero out the transmit buffer to the Scanner.
First Pass
S:1
15
0
FLL
Fill File
Source 0
Dest #N20:0
Length 12
Automatically have the SST-PFB-SCL scanner's watchdog period track that of the SCL processor (recommended per SST user manual)
1
MOV
Move
Source S:3
2561<
Dest M0:1.4011
?<
The Scanner is configured to 12 bytes (6 words) of inputs for each drive. Two drives require 24 bytes (12 words).
Read the drives data from the Profibus scanner.
File N10: contains the acutal read data that can be used elsewhere in the ladder program.
Station 1 Station 2 Description
M1:1.0 (N10:0) M1:1.6 (N10:6) Logic Status
M1:1.1 (N10:1) M1:1.7 (N10:7) Speed Feedback
M1:1.2 (N10:2) M1:1.8 (N10:8) Parameter Protocol Word 1 (PCA)
M1:1.3 (N10:3) M1:1.9 (N10:9) Parameter Protocol Word 2 (IND)
M1:1.4 (N10:4) M1:1.10 (N10:10) Parameter Protocol Word 3 (PVA 1)
M1:1.5 (N10:5) M1:1.11 (N10:11) Parameter Protocol Word 4 (PVA 2)
2
COP
Copy File
Source #M1:1.0
Dest #N10:0
Length 12
Execute LAD 3 - Station 1 Drive Logic
3
JSR
Jump To Subroutine
SBR File Number U:3
Execute LAD 4 - Station 2 Drive Logic
4
JSR
Jump To Subroutine
SBR File Number U:4
Write the drives' data to the profibus scanner.
File N20: contains the actual write data generated elsewhere in the ladder program.
Station 1 Station Description
M0:1.0 (N20:0) M0:1.6 (N20:6) Logic Command
M0:1.1 (N20:1) M0:1.7 (N20:7) Speed Reference
M0:1.2 (N20:2) M0:1.8 (N20:8) Parameter Protocol Word 1 (PCA)
M0:1.3 (N20:3) M0:1.9 (N20:9) Parameter Protocol Word 2 (IND)
M0:1.4 (N20:4) M0:1.10 (N20:10) Parameter Protocol Word 3 (PVA1)
M0:1.5 (N20:5) M0:1.11 (N20:11) Parameter Protocol Word 4 (PVA2)
5
COP
Copy File
Source #N20:0
Dest #M0:1.0
Length 12
6
END

Figure D.2 Drive 0 Control/Reference/Parameter Access Routine

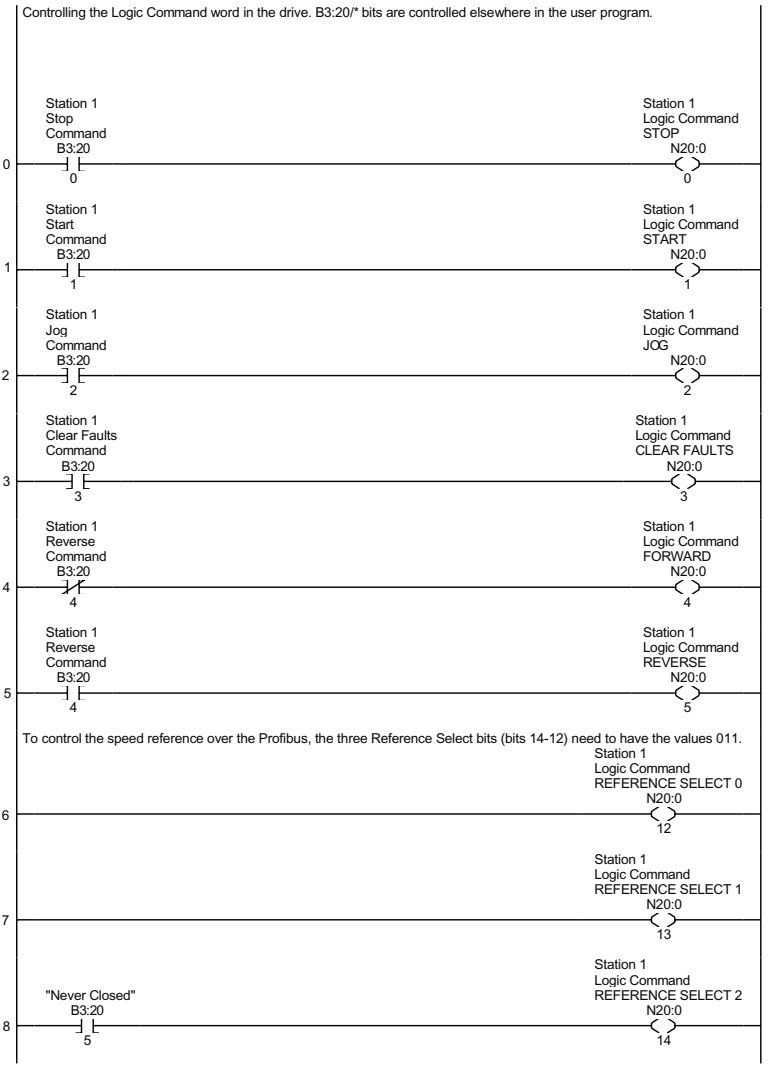

Controlling the Logic Command word in the drive. B3:20/* bits are controlled elsewhere in the user program.
Station 1 Stop Command B3:20 0
Station 1 Logic Command STOP N20:0 0
0
Station 1 Start Command B3:20 1
Station 1 Logic Command START N20:0 1
1
Station 1 Jog Command B3:20 2
Station 1 Logic Command JOG N20:0 2
2
Station 1 Clear Faults Command B3:20 3
Station 1 Logic Command CLEAR FAULTS N20:0 3
3
Station 1 Reverse Command B3:20 4
Station 1 Logic Command FORWARD N20:0 4
4
Station 1 Reverse Command B3:20 4
Station 1 Logic Command REVERSE N20:0 5
5
To control the speed reference over the Profibus, the three Reference Select bits (bits 14-12) need to have the values 011.
Station 1 Logic Command REFERENCE SELECT 0 N20:0 12
6
Station 1 Logic Command REFERENCE SELECT 1 N20:0 13
7
"Never Closed" B3:20 5
Station 1 Logic Command REFERENCE SELECT 2 N20:0 14
8

Figure D.2 Drive 0 Control/Reference/Parameter Access Routine (continued)

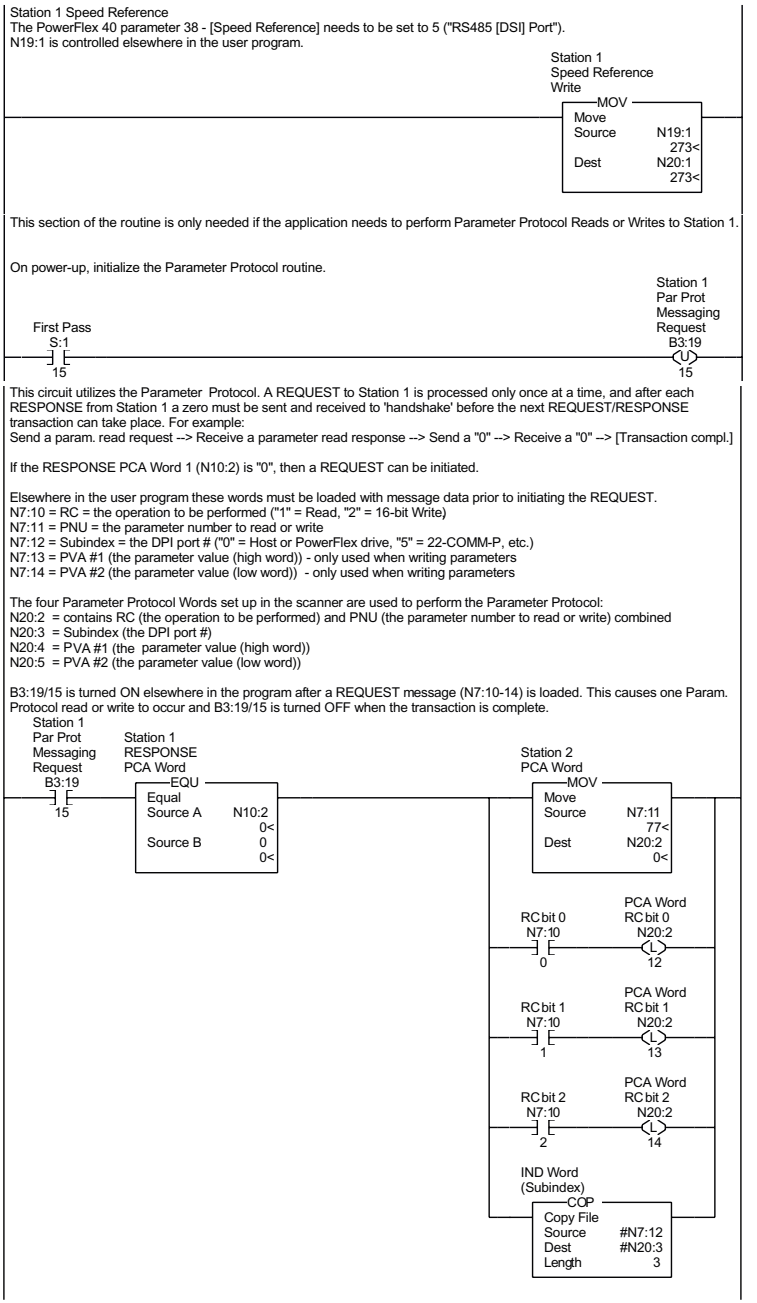

Station 1 Speed Reference
The PowerFlex 40 parameter 38 - [Speed Reference] needs to be set to 5 ("RS485 [DSI] Port").
N19:1 is controlled elsewhere in the user program.
Station 1
Speed Reference
Write
9
MOV
Move
Source N19:1
273<
Dest N20:1
273<
This section of the routine is only needed if the application needs to perform Parameter Protocol Reads or Writes to Station 1.
On power-up, initialize the Parameter Protocol routine.
Station 1
Par Prot
Messaging
Request
B3:19
First Pass
S:1
10
15
15
This circuit utilizes the Parameter Protocol. A REQUEST to Station 1 is processed only once at a time, and after each RESPONSE from Station 1 a zero must be sent and received to 'handshake' before the next REQUEST/RESPONSE transaction can take place. For example:
Send a param. read request --> Receive a parameter read response --> Send a "0" --> Receive a "0" --> [Transaction compl.]
If the RESPONSE PCA Word 1 (N10:2) is "0", then a REQUEST can be initiated.
Elsewhere in the user program these words must be loaded with message data prior to initiating the REQUEST.
N7:10 = RC = the operation to be performed ("1" = Read, "2" = 16-bit Write)
N7:11 = PNU = the parameter number to read or write
N7:12 = Subindex = the DPI port # ("0" = Host or PowerFlex drive, "5" = 22-COMM-P, etc.)
N7:13 = PVA #1 (the parameter value (high word)) - only used when writing parameters
N7:14 = PVA #2 (the parameter value (low word)) - only used when writing parameters
The four Parameter Protocol Words set up in the scanner are used to perform the Parameter Protocol:
N20:2 = contains RC (the operation to be performed) and PNU (the parameter number to read or write) combined
N20:3 = Subindex (the DPI port #)
N20:4 = PVA #1 (the parameter value (high word))
N20:5 = PVA #2 (the parameter value (low word))
B3:19/15 is turned ON elsewhere in the program after a REQUEST message (N7:10-14) is loaded. This causes one Param. Protocol read or write to occur and B3:19/15 is turned OFF when the transaction is complete.
Station 1
Par Prot
Messaging
Request
B3:19
Station 1
RESPONSE
PCA Word
Station 2
PCA Word
11
15
EQU
Equal
Source A N10:2
0<
Source B 0
0<
MOV
Move
Source N7:11
77<
Dest N20:2
0<
RC bit 0
N7:10
0
PCA Word
RC bit 0
N20:2
12
RC bit 1
N7:10
1
PCA Word
RC bit 1
N20:2
13
RC bit 2
N7:10
2
PCA Word
RC bit 2
N20:2
14
IND Word
(Subindex)
COP
Copy File
Source #N7:12
Dest #N20:3
Length 3

Figure D.2 Drive 0 Control/Reference/Parameter Access Routine (continued)

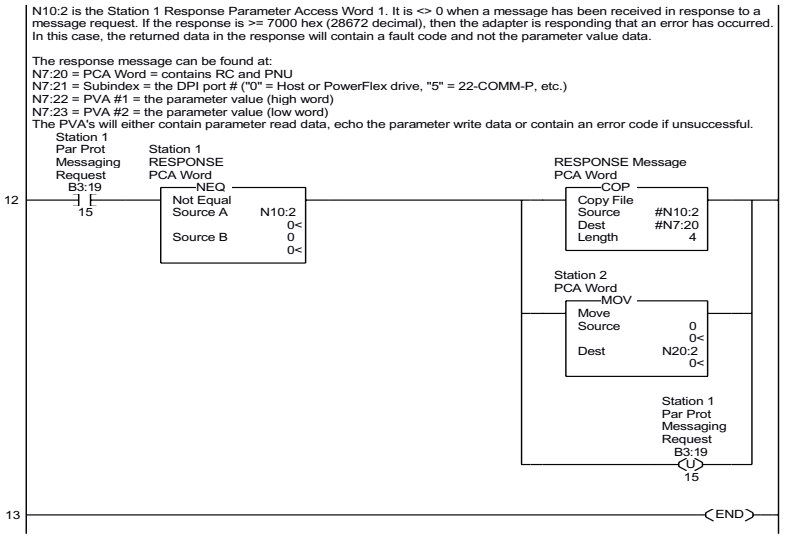

N10:2 is the Station 1 Response Parameter Access Word 1. It is <> 0 when a message has been received in response to a message request. If the response is >= 7000 hex (28672 decimal), then the adapter is responding that an error has occurred. In this case, the returned data in the response will contain a fault code and not the parameter value data.
The response message can be found at:
N7:20 = PCA Word = contains RC and PNU
N7:21 = Subindex = the DPI port # ("0" = Host or PowerFlex drive, "5" = 22-COMM-P, etc.)
N7:22 = PVA #1 = the parameter value (high word)
N7:23 = PVA #2 = the parameter value (low word)
The PVA's will either contain parameter read data, echo the parameter write data or contain an error code if unsuccessful.
Station 1 Par Prot Messaging Request B3:19 15
Station 1 RESPONSE PCA Word
NEQ Not Equal Source A N10:2 0< Source B 0 0<
RESPONSE Message PCA Word
COP Copy File Source #N10:2 Dest #N7:20 Length 4
Station 2 PCA Word
MOV Move Source 0 0< Dest N20:2 0<
Station 1 Par Prot Messaging Request B3:19 15
12
13
END

Figure D.3 Drive 1 Control/Reference/Parameter Access Routine

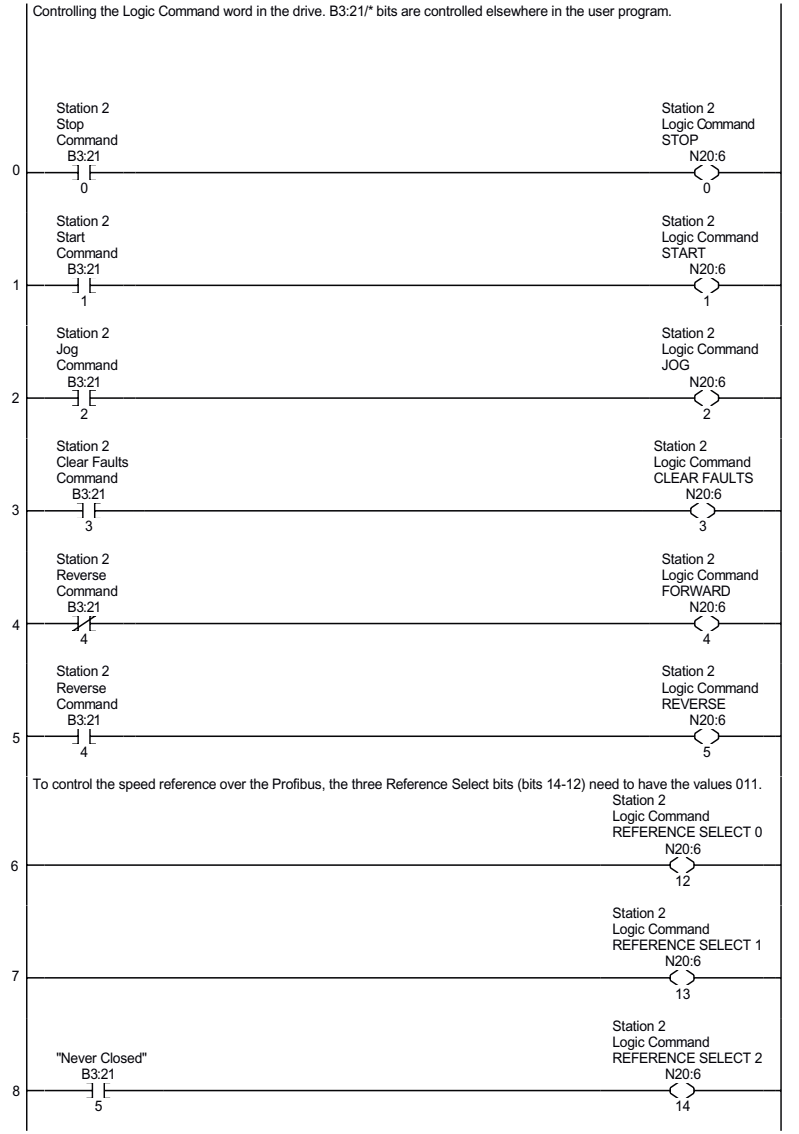

Controlling the Logic Command word in the drive. B3:21/* bits are controlled elsewhere in the user program.
Station 2 Stop Command B3:21 0
Station 2 Logic Command STOP N20:6 0
0
Station 2 Start Command B3:21 1
Station 2 Logic Command START N20:6 1
1
Station 2 Jog Command B3:21 2
Station 2 Logic Command JOG N20:6 2
2
Station 2 Clear Faults Command B3:21 3
Station 2 Logic Command CLEAR FAULTS N20:6 3
3
Station 2 Reverse Command B3:21 4
Station 2 Logic Command FORWARD N20:6 4
4
Station 2 Reverse Command B3:21 4
Station 2 Logic Command REVERSE N20:6 5
5
To control the speed reference over the Profibus, the three Reference Select bits (bits 14-12) need to have the values 011.
Station 2 Logic Command REFERENCE SELECT 0 N20:6 12
6
Station 2 Logic Command REFERENCE SELECT 1 N20:6 13
7
"Never Closed" B3:21 5
Station 2 Logic Command REFERENCE SELECT 2 N20:6 14
8

Figure D.3 Drive 1 Control/Reference/Parameter Access Routine (continued)

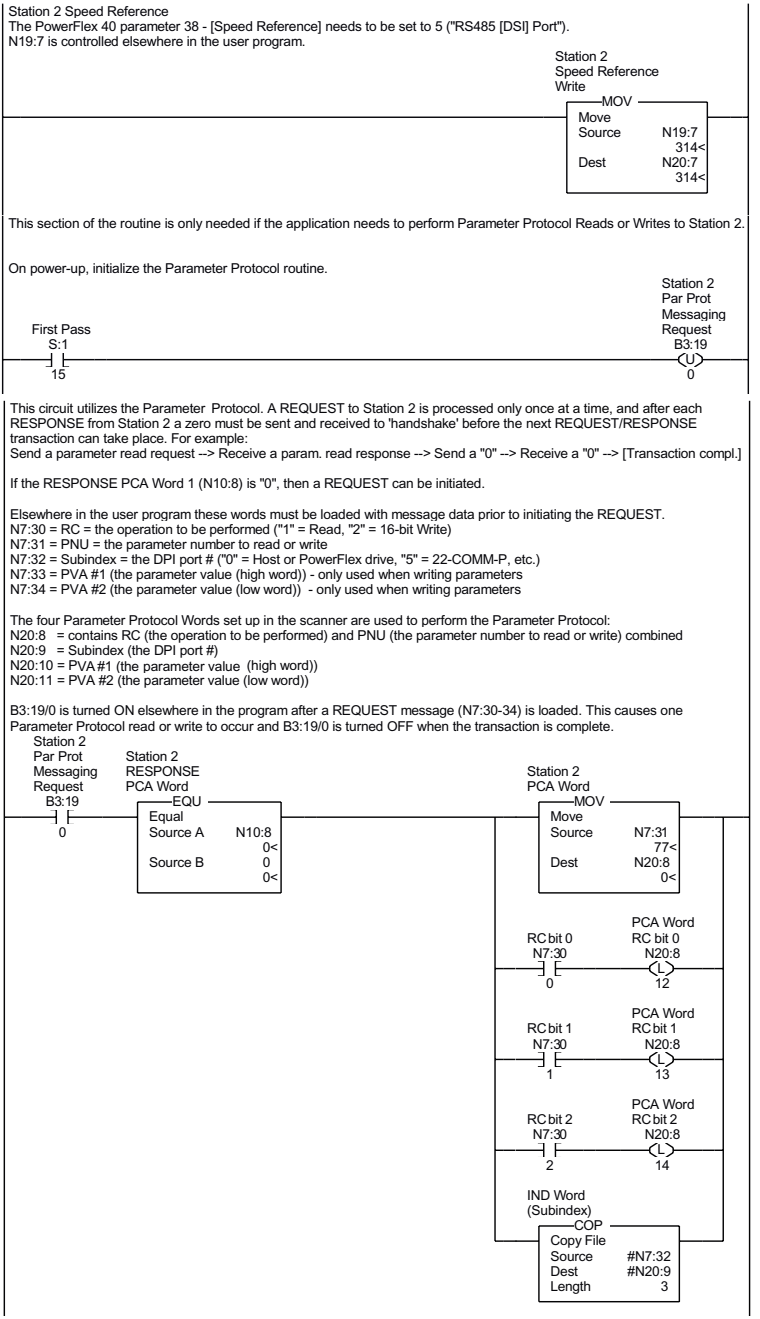
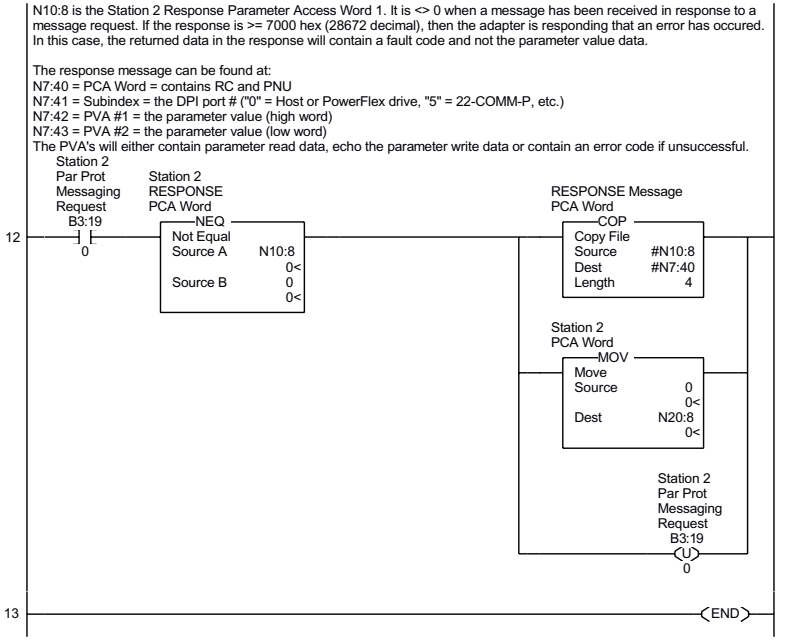

Station 2 Speed Reference
The PowerFlex 40 parameter 38 - [Speed Reference] needs to be set to 5 ("RS485 [DSI] Port").
N19:7 is controlled elsewhere in the user program.
Station 2 Speed Reference Write
9
MOV
Move
Source N19:7 314<
Dest N20:7 314<
This section of the routine is only needed if the application needs to perform Parameter Protocol Reads or Writes to Station 2.
On power-up, initialize the Parameter Protocol routine.
Station 2 Par Prot Messaging Request B3:19
First Pass S:1 15
10
U
0
This circuit utilizes the Parameter Protocol. A REQUEST to Station 2 is processed only once at a time, and after each RESPONSE from Station 2 a zero must be sent and received to 'handshake' before the next REQUEST/RESPONSE transaction can take place. For example:
Send a parameter read request --> Receive a param. read response --> Send a "0" --> Receive a "0" --> [Transaction compl.]
If the RESPONSE PCA Word 1 (N10:8) is "0", then a REQUEST can be initiated.
Elsewhere in the user program these words must be loaded with message data prior to initiating the REQUEST.
N7:30 = RC = the operation to be performed ("1" = Read, "2" = 16-bit Write)
N7:31 = PNU = the parameter number to read or write
N7:32 = Subindex = the DPI port # ("0" = Host or PowerFlex drive, "5" = 22-COMM-P, etc.)
N7:33 = PVA #1 (the parameter value (high word)) - only used when writing parameters
N7:34 = PVA #2 (the parameter value (low word)) - only used when writing parameters
The four Parameter Protocol Words set up in the scanner are used to perform the Parameter Protocol:
N20:8 = contains RC (the operation to be performed) and PNU (the parameter number to read or write) combined
N20:9 = Subindex (the DPI port #)
N20:10 = PVA #1 (the parameter value (high word))
N20:11 = PVA #2 (the parameter value (low word))
B3:19/0 is turned ON elsewhere in the program after a REQUEST message (N7:30-34) is loaded. This causes one Parameter Protocol read or write to occur and B3:19/0 is turned OFF when the transaction is complete.
Station 2 Par Prot Messaging Request B3:19 0
11
Station 2 RESPONSE PCA Word
EQU
Equal
Source A N10:8 0<
Source B 0 0<
Station 2 PCA Word
MOV
Move
Source N7:31 77<
Dest N20:8 0<
RC bit 0 N7:30 0
PCA Word RC bit 0 N20:8 12
RC bit 1 N7:30 1
PCA Word RC bit 1 N20:8 13
RC bit 2 N7:30 2
PCA Word RC bit 2 N20:8 14
IND Word (Subindex)
COP
Copy File
Source #N7:32
Dest #N20:9
Length 3

Figure D.3 Drive 1 Control/Reference/Parameter Access Routine (continued)


N10:8 is the Station 2 Response Parameter Access Word 1. It is <> 0 when a message has been received in response to a message request. If the response is >= 7000 hex (28672 decimal), then the adapter is responding that an error has occured. In this case, the returned data in the response will contain a fault code and not the parameter value data.
The response message can be found at:
N7:40 = PCA Word = contains RC and PNU
N7:41 = Subindex = the DPI port # ("0" = Host or PowerFlex drive, "5" = 22-COMM-P, etc.)
N7:42 = PVA #1 = the parameter value (high word)
N7:43 = PVA #2 = the parameter value (low word)
The PVA's will either contain parameter read data, echo the parameter write data or contain an error code if unsuccessful.
Station 2 Par Prot Messaging Request B3:19 0
Station 2 RESPONSE PCA Word
NEQ Not Equal Source A N10:8 0< Source B 0 0<
RESPONSE Message PCA Word
COP Copy File Source #N10:8 Dest #N7:40 Length 4
Station 2 PCA Word
MOV Move Source 0 0< Dest N20:8 0<
Station 2 Par Prot Messaging Request B3:19 U 0
12
13
END

Multi Drive Example

Figure D.4 Main Routine

This example program is for a PROFIBUS demonstration using a SLC 5&05 processor with an SST Profibus scanner (SST-PFB-SLC) in the first slot of the rack. The program is written for 3 drives with one Profibus adapter on the network (MultiDrive Mode):

Station 0 PowerFlex 40 with 22-COMM-P
Station 1 PowerFlex 40
Station 2 PowerFlex 40

The expample program demonstrates using Logic Command / Reference, Logic Status / Feedback and Parameter Access using the Parameter Protocol.

On power-up, zero out the transmit buffer to the Scanner.

0 First Pass S:1 15

FLL
Fill File
Source 0
Dest #N20:0
Length 10

Automatically have the SST-PFB-SCL scanner's watchdog period track that of the SCL processor (recommended per SST user manual)

1

MOV
Move
Source S:3
2561<
Dest M0:1.4011
?<

The Scanner is configured to 20 bytes (10 words) of inputs: 4 Bytes "Ctrl/Stat & Ref Fdbk" for each drive (= 12 Bytes)
8 Bytes "Parameter Access"

Read the drives data from the Profibus scanner.

File N10: contains the acutal read data that can be used elsewhere in the ladder program.

Address		Description
M1:1.0	(N10:0)	Logic Status Drive 0
M1:1.1	(N10:1)	Speed Feedback Drive 0
M1:1.2	(N10:2)	Logic Status Drive 1
M1:1.3	(N10:3)	Speed Feedback Drive 1
M1:1.4	(N10:4)	Logic Status Drive 2
M1:1.5	(N10:5)	Speed Feedback Drive 2
M1:1.6	(N10:6)	Parameter Access Word 1 (PCA)
M1:1.7	(N10:7)	Parameter Access Word 2 (IND)
M1:1.8	(N10:8)	Parameter Access Word 3 (PVA 1)
M1:1.9	(N10:9)	Parameter Access Word 4 (PVA 2)

2

COP
Copy File
Source #M1:1.0
Dest #N10:0
Length 10

Execute LAD 3 - Station 0 Drive Logic

3

JSR
Jump To Subroutine
SBR File Number U:3

Execute LAD 4 - Station 1 Drive Logic

4

JSR
Jump To Subroutine
SBR File Number U:4

Figure D.4 Main Routine (continued)

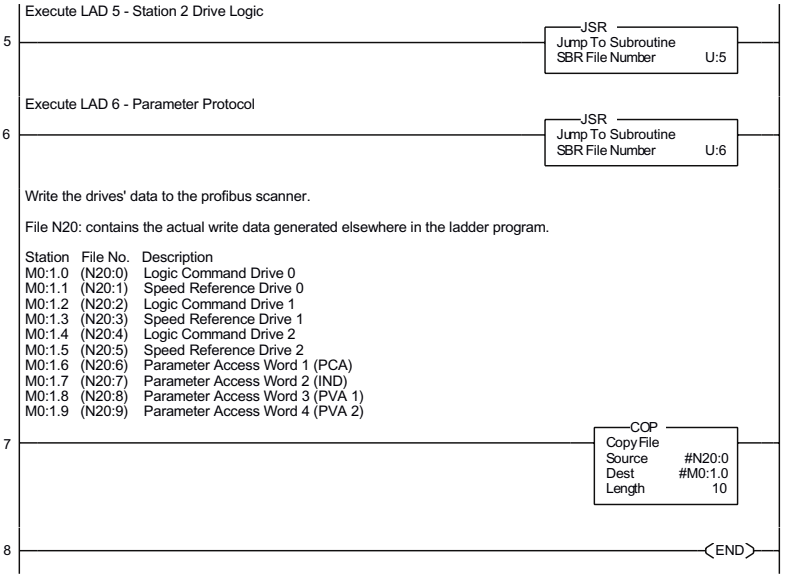

Execute LAD 5 - Station 2 Drive Logic
5
JSR
Jump To Subroutine
SBR File Number U:5
Execute LAD 6 - Parameter Protocol
6
JSR
Jump To Subroutine
SBR File Number U:6
Write the drives' data to the profibus scanner.
File N20: contains the actual write data generated elsewhere in the ladder program.
Station File No. Description
M0:1.0 (N20:0) Logic Command Drive 0
M0:1.1 (N20:1) Speed Reference Drive 0
M0:1.2 (N20:2) Logic Command Drive 1
M0:1.3 (N20:3) Speed Reference Drive 1
M0:1.4 (N20:4) Logic Command Drive 2
M0:1.5 (N20:5) Speed Reference Drive 2
M0:1.6 (N20:6) Parameter Access Word 1 (PCA)
M0:1.7 (N20:7) Parameter Access Word 2 (IND)
M0:1.8 (N20:8) Parameter Access Word 3 (PVA 1)
M0:1.9 (N20:9) Parameter Access Word 4 (PVA 2)
7
COP
Copy File
Source #N20:0
Dest #M0:1.0
Length 10
8
END

Figure D.5 Drive 0 Control/Reference Routine

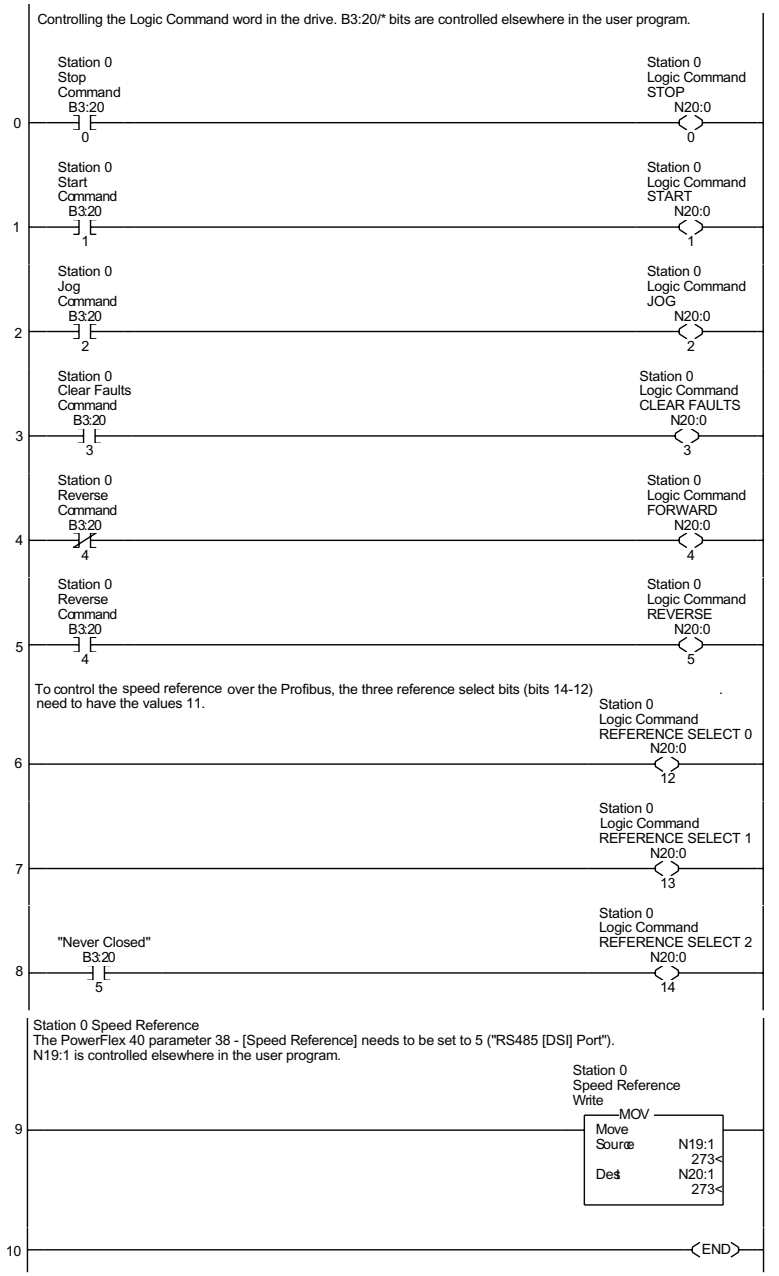

Controlling the Logic Command word in the drive. B3:20/* bits are controlled elsewhere in the user program.
Station 0 Stop Command B3:20 0
Station 0 Logic Command STOP N20:0 0
Station 0 Start Command B3:20 1
Station 0 Logic Command START N20:0 1
Station 0 Jog Command B3:20 2
Station 0 Logic Command JOG N20:0 2
Station 0 Clear Faults Command B3:20 3
Station 0 Logic Command CLEAR FAULTS N20:0 3
Station 0 Reverse Command B3:20 4
Station 0 Logic Command FORWARD N20:0 4
Station 0 Reverse Command B3:20 4
Station 0 Logic Command REVERSE N20:0 5
To control the speed reference over the Profibus, the three reference select bits (bits 14-12) need to have the values 11.
Station 0 Logic Command REFERENCE SELECT 0 N20:0 12
Station 0 Logic Command REFERENCE SELECT 1 N20:0 13
"Never Closed" B3:20 5
Station 0 Logic Command REFERENCE SELECT 2 N20:0 14
Station 0 Speed Reference
The PowerFlex 40 parameter 38 - [Speed Reference] needs to be set to 5 ("RS485 [DSI] Port").
N19:1 is controlled elsewhere in the user program.
Station 0 Speed Reference Write
MOV
Move
Source N19:1 273<
Dest N20:1 273<
END

Figure D.6 Drive 0-1 Control/Reference Routine

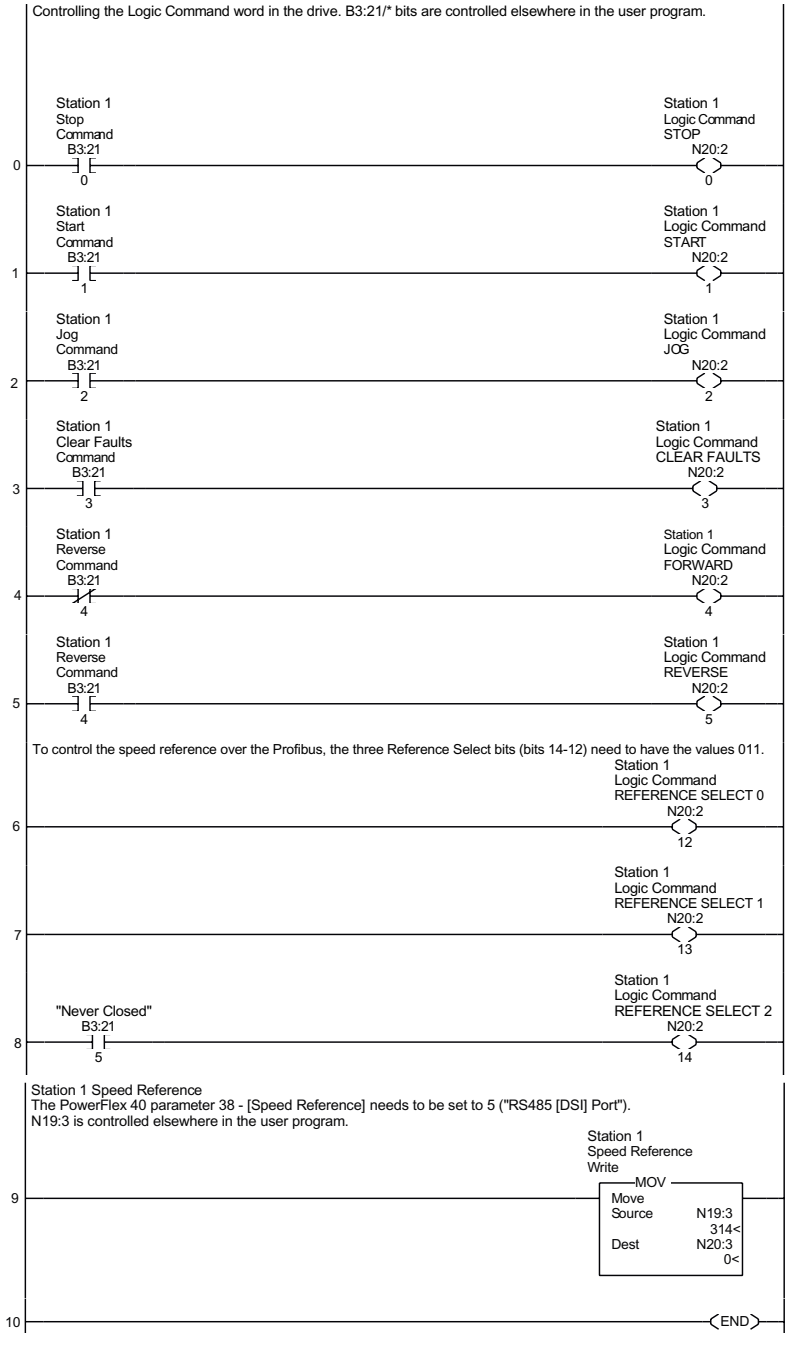

Controlling the Logic Command word in the drive. B3:21/* bits are controlled elsewhere in the user program.
Station 1 Stop Command B3:21 0
Station 1 Logic Command STOP N20:2 0
Station 1 Start Command B3:21 1
Station 1 Logic Command START N20:2 1
Station 1 Jog Command B3:21 2
Station 1 Logic Command JOG N20:2 2
Station 1 Clear Faults Command B3:21 3
Station 1 Logic Command CLEAR FAULTS N20:2 3
Station 1 Reverse Command B3:21 4
Station 1 Logic Command FORWARD N20:2 4
Station 1 Reverse Command B3:21 4
Station 1 Logic Command REVERSE N20:2 5
To control the speed reference over the Profibus, the three Reference Select bits (bits 14-12) need to have the values 011.
Station 1 Logic Command REFERENCE SELECT 0 N20:2 12
Station 1 Logic Command REFERENCE SELECT 1 N20:2 13
"Never Closed" B3:21 5
Station 1 Logic Command REFERENCE SELECT 2 N20:2 14
Station 1 Speed Reference
The PowerFlex 40 parameter 38 - [Speed Reference] needs to be set to 5 ("RS485 [DSI] Port").
N19:3 is controlled elsewhere in the user program.
Station 1 Speed Reference Write
MOV
Move
Source N19:3 314<
Dest N20:3 0<
END

Figure D.7 Drive 0-2 Control/Reference Routine

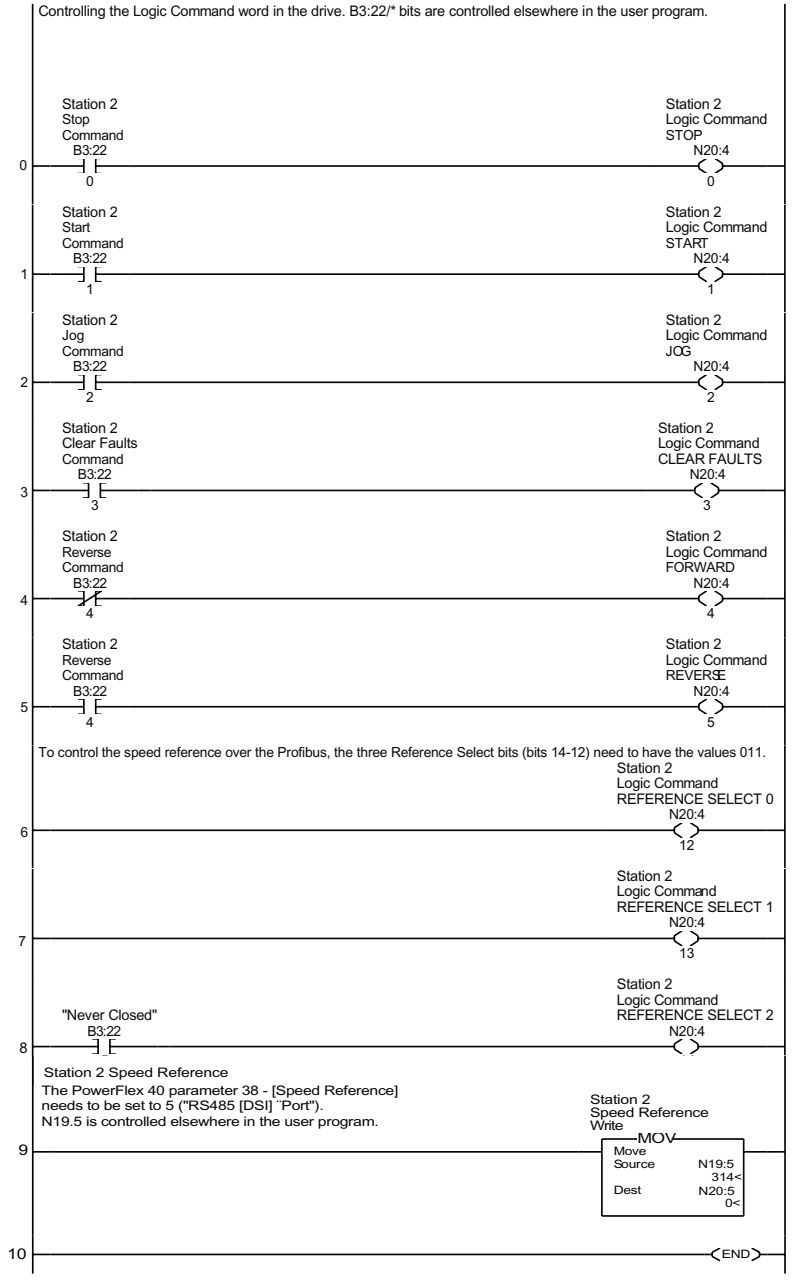

Controlling the Logic Command word in the drive. B3:22/* bits are controlled elsewhere in the user program.
Station 2 Stop Command B3:22 0
Station 2 Logic Command STOP N20:4 0
Station 2 Start Command B3:22 1
Station 2 Logic Command START N20:4 1
Station 2 Jog Command B3:22 2
Station 2 Logic Command JOG N20:4 2
Station 2 Clear Faults Command B3:22 3
Station 2 Logic Command CLEAR FAULTS N20:4 3
Station 2 Reverse Command B3:22 4
Station 2 Logic Command FORWARD N20:4 4
Station 2 Reverse Command B3:22 4
Station 2 Logic Command REVERSE N20:4 5
To control the speed reference over the Profibus, the three Reference Select bits (bits 14-12) need to have the values 011.
Station 2 Logic Command REFERENCE SELECT 0 N20:4 12
Station 2 Logic Command REFERENCE SELECT 1 N20:4 13
"Never Closed" B3:22
Station 2 Logic Command REFERENCE SELECT 2 N20:4
Station 2 Speed Reference
The PowerFlex 40 parameter 38 - [Speed Reference] needs to be set to 5 ("RS485 [DSI] Port").
N19.5 is controlled elsewhere in the user program.
Station 2 Speed Reference Write
MOV
Move
Source N19:5 314<
Dest N20:5 0<
END

Figure D.8 Parameter Accessing Routine

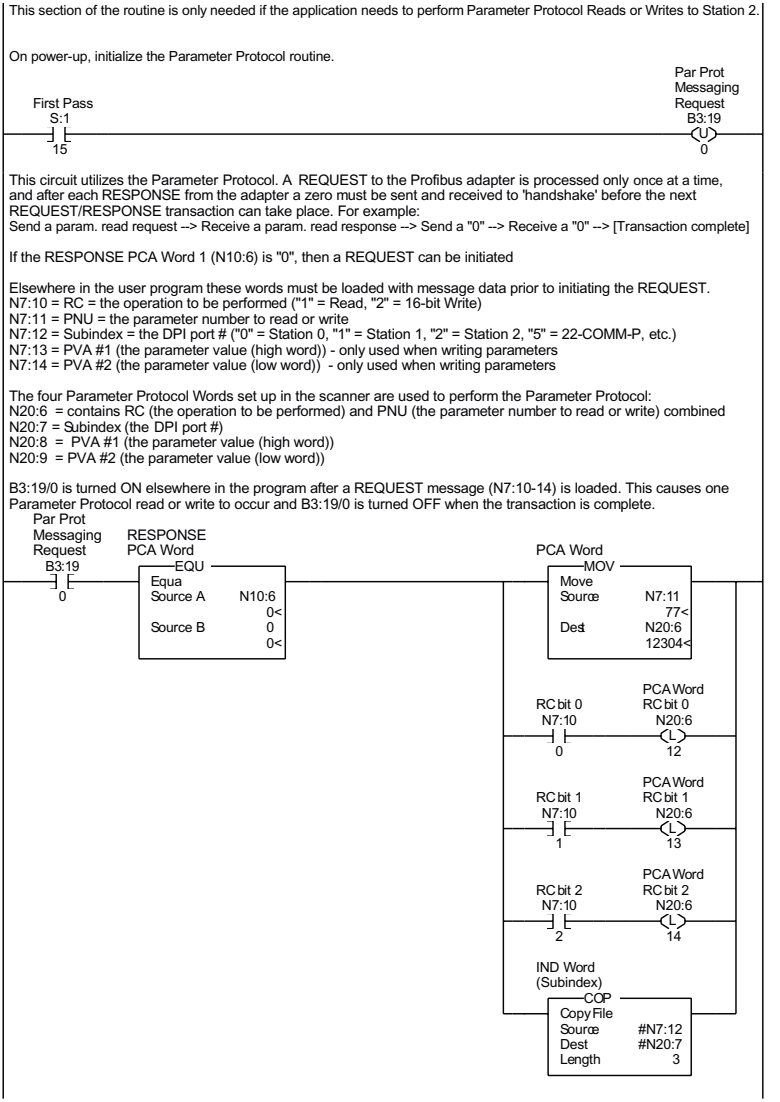
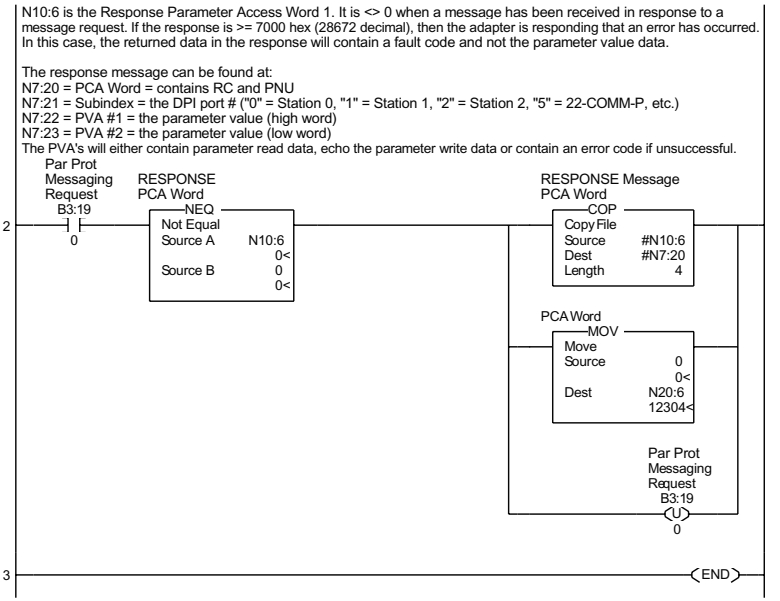

This section of the routine is only needed if the application needs to perform Parameter Protocol Reads or Writes to Station 2.
On power-up, initialize the Parameter Protocol routine.
First Pass
S:1
15
Par Prot
Messaging
Request
B3:19
0
This circuit utilizes the Parameter Protocol. A REQUEST to the Profibus adapter is processed only once at a time, and after each RESPONSE from the adapter a zero must be sent and received to 'handshake' before the next REQUEST/RESPONSE transaction can take place. For example:
Send a param. read request --> Receive a param. read response --> Send a "0" --> Receive a "0" --> [Transaction complete]
If the RESPONSE PCA Word 1 (N10:6) is "0", then a REQUEST can be initiated
Elsewhere in the user program these words must be loaded with message data prior to initiating the REQUEST.
N7:10 = RC = the operation to be performed ("1" = Read, "2" = 16-bit Write)
N7:11 = PNU = the parameter number to read or write
N7:12 = Subindex = the DPI port # ("0" = Station 0, "1" = Station 1, "2" = Station 2, "5" = 22-COMM-P, etc.)
N7:13 = PVA #1 (the parameter value (high word)) - only used when writing parameters
N7:14 = PVA #2 (the parameter value (low word)) - only used when writing parameters
The four Parameter Protocol Words set up in the scanner are used to perform the Parameter Protocol:
N20:6 = contains RC (the operation to be performed) and PNU (the parameter number to read or write) combined
N20:7 = Subindex (the DPI port #)
N20:8 = PVA #1 (the parameter value (high word))
N20:9 = PVA #2 (the parameter value (low word))
B3:19/0 is turned ON elsewhere in the program after a REQUEST message (N7:10-14) is loaded. This causes one Parameter Protocol read or write to occur and B3:19/0 is turned OFF when the transaction is complete.
Par Prot
Messaging
Request
B3:19
0
RESPONSE
PCA Word
EQU
Equa
Source A N10:6
0<
Source B 0
0<
PCA Word
MOV
Move
Source N7:11
77<
Dest N20:6
12304<
RC bit 0
N7:10
0
PCA Word
RC bit 0
N20:6
12
RC bit 1
N7:10
1
PCA Word
RC bit 1
N20:6
13
RC bit 2
N7:10
2
PCA Word
RC bit 2
N20:6
14
IND Word
(Subindex)
COP
Copy File
Source #N7:12
Dest #N20:7
Length 3

Figure D.8 Parameter Accessing Routine (continued)


N10:6 is the Response Parameter Access Word 1. It is <> 0 when a message has been received in response to a message request. If the response is >= 7000 hex (28672 decimal), then the adapter is responding that an error has occurred. In this case, the returned data in the response will contain a fault code and not the parameter value data.
The response message can be found at:
N7:20 = PCA Word = contains RC and PNU
N7:21 = Subindex = the DPI port # ("0" = Station 0, "1" = Station 1, "2" = Station 2, "5" = 22-COMM-P, etc.)
N7:22 = PVA #1 = the parameter value (high word)
N7:23 = PVA #2 = the parameter value (low word)
The PVA's will either contain parameter read data, echo the parameter write data or contain an error code if unsuccessful.
Par Prot Messaging Request B3:19
0
RESPONSE PCA Word
NEQ
Not Equal
Source A N10:6
0<
Source B 0
0<
RESPONSE Message PCA Word
COP
Copy File
Source #N10:6
Dest #N7:20
Length 4
PCA Word
MOV
Move
Source 0
0<
Dest N20:6
12304<
Par Prot Messaging Request B3:19
U
0
2
3
END

A

Adapter

Devices such as drives, controllers, and computers usually require an adapter to provide a communication interface between them and a network such as Profibus. An adapter reads data on the network and transmits it to the connected device. It also reads data in the device and transmits it to the network.

The 22-COMM-P Profibus adapter is an adapter that connects, PowerFlex drives to a Profibus Network. Adapters are sometimes also called “cards,” “embedded communication options,” “gateways,” “modules,” and “peripherals.”

C

ControlFLASH

ControlFLASH is an Allen-Bradley software tool that lets users electronically update firmware on printed circuit boards. The tool takes advantage of the growing use of flash memory (electronic erasable chips) across industrial control products.

Controller

A controller, also called programmable logic controller, is a solid-state control system that has a user-programmable memory for storage of instructions to implement specific functions such as I/O control, logic, timing, counting, report generation, communication, arithmetic, and data file manipulation. A controller consists of a central processor, input/ output interface, and memory. See also Scanner.

D

Data Rate

The data rate is the speed at which data is transferred on the Profibus network. The available data rates depend on the type of cable and total cable length used on the network:

Baudrate	Maximum Cable Length
9.6kbps	1000m
19.2kbps	1000m
93.75kbps	1000m
187.5kbps	1000m
500kbps	400m
1.5Mbps	200m
3Mbps	100m
6Mbps	100m
12Mbps	100m

DSI

Drive Serial Interface - a modification of the ModBus RS-485 serial communication protocol used by various Allen-Bradley drives and power products.

DSI Peripheral

A device that provides an interface between DSI and a network or user. Peripheral devices are also referred to as “adapters” and “modules.” The serial converter and PowerFlex 4-Class HIMs (22-HIM-*) are examples of DSI peripherals.

DSI Product

A device that uses the DSI communications interface to communicate with one or more peripheral devices. For example, a motor drive such as a PowerFlex 4-Class drive is a DSI product. In this manual, a DSI product is also referred to as “product” or “host.”

DriveExplorer Software

DriveExplorer software is a tool for monitoring and configuring Allen-Bradley drives and communication adapters. It can be run on computers running Microsoft Windows 95, 98, ME, NT 4.0 (Service Pack 3 or later), 2000, XP and CE (version 2.11 and higher) operating systems. DriveExplorer (version 3.01 or higher) can be used for this communication adapter and PowerFlex 4-Class drives. Information about DriveExplorer software and a free lite version can be accessed at http://www.ab.com/drives/driveexplorer.

DriveTools SP Software

DriveTools SP Software is a tool for monitoring and configuring Allen Bradley drives and communication adapters. It can be run on computers running Microsoft Windows 98, ME, NT 4.0 (Service Pack 3 or later) 2000 and XP operating systems. DriveTools SP (version 2.02 or higher) can be used for this communication adapter and PowerFlex 4-Class drives. Information about DriveTools SP can be accessed at http://www.ab.com/drives/drivetools/index.

F

Fault Action

A fault action determines how the adapter and connected product act when a communications fault (for example, a cable is disconnected) occurs or when the scanner is switched out of run mode. The former uses a communications fault action, and the latter uses an idle fault action.

Fault Configuration

When communications are disrupted (for example, a cable is disconnected), the adapter and PowerFlex drive can respond with a user-defined fault configuration. The user sets the data that is sent to the drive in the fault configuration parameters (**Parameter 13 - [Flt Cfg Logic]** and **Parameter 14- [Flt Cfg Ref]**). When a fault action parameter is set to use the fault configuration and a fault occurs, the data from these parameters is sent as the Command Logic and/or Reference.

Feedback

See Reference/Feedback

Flash Update

The process of updating firmware in the adapter. The adapter can be flash updated using the controlFLASH tool or the X-Modem protocol and a 1203-SSS Smart Self-powered Serial converter (firmware 3.001 or higher firmware).

G

GSD File

A GSD File is a file used by network configuration tools to configure the adapter. The GSD file contains GSD modules for setting up the communication with the adapter.

H

HIM (Human Interface Module)

A device that can be used to configure and control a PowerFlex 4-Class drive. PowerFlex 4-Class HIMs (22-HIM-*) can be used to configure connected peripherals.

Hold Last

When communications are disrupted (for example, a cable is disconnected), the adapter and PowerFlex drive can respond by holding last. Hold last results in the drive receiving the last data received via the Profibus connection before the disruption. If the drive was running and using the Reference from the adapter, it will continue to run at the same Reference.

I

I/O Data

I/O data, sometimes called “implicit messages” or “input/output,” transmit time-critical data such as a Logic Command and Reference. The terms “input” and “output” are defined from the scanner’s point of view. Output is transmitted by the scanner and consumed by the adapter. Input is transmitted by the adapter and consumed by the scanner.

L

Logic Command/Logic Status

The Logic Command is used to control the PowerFlex drive (e.g., start, stop, direction). It consists of one 16-bit word of input to the adapter from the network. The definitions of the bits in this word depend on the drive.

The Logic Status is used to monitor the PowerFlex drive (for example, operating state, motor direction). It consists of one 16-bit word of output from the adapter to the network. The definitions of the bits in this word depend on the drive.

M

Master

See Scanner

N

Node Address

A Profibus network can have as many as 126 devices connected to it. Each device on the network must have a unique node address between 0 and 126.

NVS (Non-Volatile Storage)

NVS is the permanent memory of a device. Devices such as the adapter and drive store parameters and other information in NVS so that they are not lost when the device loses power. NVS is sometimes called "EEPROM."

P

Parameter Messaging

Parameter Messages are used to configure, monitor, and diagnose devices over Profibus.

PowerFlex 4-Class Drives

The Allen-Bradley PowerFlex 4-Class family of drives include the PowerFlex 4 and PowerFlex 40. These drives can be used for applications ranging from 0.2 kW (0.25 HP) to 11kW (15 HP). All PowerFlex 4-Class drives implement DSI, allowing those that support an internal adapter to use the 22-COMM-P Profibus adapter. The adapter can be installed in a PowerFlex 40 drive but not in the PowerFlex 4. This manual focuses on using the adapter with a PowerFlex 40 drive.

Profibus Network

A Profibus network uses RS485 to connect devices (for example, controllers, drives, and motor starters). A Profibus network can support a maximum of 126 devices. Each device is assigned a unique node address and transmits data on the network at the same data rate.
A cable is used to connect devices on the network. It contains the bus signal. Devices can be connected to the network in a daisy chain connection.

General information about Profibus and the Profibus specification are maintained by the Profibus Trade Organization (PTO). PTO is online at http://www.profibus.com.

R

Reference/Feedback

The Reference is used to send a Reference (for example, speed, frequency, torque) to the product. It consists of one word of input to the adapter from the network. The size of the word (either a 16-bit word or 32-bit word) is determined by the drive.

Feedback is used to monitor the speed of a product. It consists of one word of output from the adapter to the network. The size of the word (either a 16-bit word or 32-bit word) is determined by the drive.

S

Scanner

A scanner is a separate module (of a multi-module controller) or a built-in component (of a single-module controller) that provides communication with adapters connected to a network. See also Controller.

A Scanner is often called Master.

Status Indicators

Status indicators are LEDs that are used to report the status of the adapter, network, and drive. They are on the adapter and can be viewed on the front cover of the drive when the drive is powered.

Z

Zero Data

When communications are disrupted (for example, a cable is disconnected), the adapter and drive can respond with zero data. Zero data results in the drive receiving zero as values for command data. If the drive was running and using the Reference from the adapter, it will stay running but at zero Reference.

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